13

CONTENTS

PAGE NOS.

NOTICE TO READERS OF THIS BULLETIN.....Inside Front Cover

SUBJECT DIVISIONS

1 AIRCRAFT AND FLIGHT EQUIPMENT..... 1
2 ASTRONOMY, GEOPHYSICS, AND GEOGRAPHY..... 2
3 CHEMICAL WARFARE EQUIPMENT AND MATERIALS..... 8
4 CHEMISTRY..... 10
5 COMMUNICATIONS..... 14
6 DETECTION..... 16
7 ELECTRICAL EQUIPMENT..... 18
8 ELECTRONICS AND ELECTRONIC EQUIPMENT..... 22
9 FLUID MECHANICS..... 36
10 FUELS AND COMBUSTION..... 41
11 GROUND TRANSPORTATION EQUIPMENT..... 42
12 GUIDED MISSILES..... 43
13 INSTALLATIONS AND CONSTRUCTION..... 48
14 MATERIALS (NON-METALLIC)..... 48
15 MATHEMATICS..... 55
16 MEDICAL SCIENCES..... 59
17 METALLURGY..... 80
18 MILITARY SCIENCES AND OPERATIONS..... 84
19 NAVIGATION..... 86
20 NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY..... 87
21 NUCLEAR PROPULSION.....No Entries
22 ORDNANCE..... 90
23 PERSONNEL AND TRAINING..... 93
24 PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES..... 94
25 PHYSICS..... 96
26 PRODUCTION AND MANAGEMENT..... 112
27 PROPULSION SYSTEMS..... 115
28 PSYCHOLOGY AND HUMAN ENGINEERING..... 117
29 QUARTERMASTER EQUIPMENT AND SUPPLIES..... 120
30 RESEARCH AND RESEARCH EQUIPMENT..... 120
31 SHIPS AND MARINE EQUIPMENT..... 125
32 MISCELLANEOUS ARTS AND SCIENCES..... 127
33 TRANSPORTATION..... 129

SUBJECT INDEX..... NI-1

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, *Director*

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CONTENTS (CON.)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

	Page
BIBLIOGRAPHY	S-1
AGRICULTURAL	S-1
ASTRONOMY	S-1
BEHAVIORAL SCIENCES	S-1
BIOLOGICAL SCIENCES	S-3
CHEMISTRY	S-21
EARTH SCIENCES	S-23
ENGINEERING	S-24
MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT	S-36
MATERIALS	S-37
MATHEMATICS	S-39
MECHANICS	S-40
METALLURGY	S-42
NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	S-44
PHYSICS	S-47
RESEARCH METHODS, TECHNIQUES AND EQUIPMENT	S-52
SOCIAL SCIENCES	S-53
AD INDEX	S-57
NUMBER INDEX	S-59
SUBJECT INDEX	S-63

This issue includes:

TAB 64 - 13

AD 437 900 - AD 439 999

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-437 975 Div. 1, 6
OTS price $5.60

Bell Helicopter Co., Fort Worth, Tex.
JANAIR JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH. TELEVISION AS AN AID TO HELICOPTER FLIGHT,
by C. B. Elam. Mar 64, 60p. TR no. D228 421 018
Contract Nonr167000
Unclassified report

Descriptors: (*Helicopters, Television display systems), Landing aids, Visual signals, Navigation aids, Flight instruments, Takeoff, Hovering, Landings, Television cameras, Installation, Flight testing, Night flight, Performance (Engineering), Effectiveness, Acceptability.

Evaluation was made of the pilot's ability to land, takeoff, hover and navigate a helicopter using television for visual contact with the ground. The effects of two experimental variables were investigated. These were the position of the forward looking TV camera (on the landing skid as compared to being at the pilot's eye level) and camera movement (fixed as against movable in pitch). Evaluation of the operations was also made under VFR as a control procedure. Measurement was made of airspeed, altitude, heading fore-aft and lateral position errors. In general, the TV condition did not compare favorably with the VFR situation in precision of control but the operations were usually successful and always safe. It was found that camera mobility facilitated the landings but was of less consequence for the other operations. It was concluded that TV, while useful, will not prove completely adequate for night flights. It is recommended that it be used in concert with the contact analog vertical display. (Author)

AD-438 166 Div. 1, 5
OTS price $4.60

Airborne Instruments Lab. Inc., Deer Park, N. Y.
STUDY OF CAPTURE-EFFECT GLIDE-SLOPE MONITOR TECHNIQUES.
Final rept.
by A. Tatz. Oct 63, 45p. Rept. no. RD64 17
Contract FA WA4385, Proj. 3182 1
Unclassified report

Descriptors: (*Terminal flight facilities, Glide path systems), Glide path systems, Radio beacons, Landing aids, Radio signals, Ultrahigh frequency, Audiofrequency, Antenna radiation patterns, Snow, Monitors.

The capture-effect glide-slope system is explained by comparison with a standard null-reference system, and the relative advantages of the glide-slope system are analyzed. A general exposition of monitor techniques leads to an analysis of capture-effect monitor problems; solutions for the particular capture-effect monitor problems are presented and logically justified. The recommended solution for the on-course monitor is recognized as the monitor-detector location is found on the antenna mast midway between the middle and bottom glide-slope antennas. An alternative solution for the course-width monitor is recognized as the monitor-detector location for the second null of the top-antenna resultant, where the middle- and bottom-antenna resultants are in phase opposition at the 180-degree dephase point for middle and bottom antennas. (Author)

AD-438 175 Div. 1, 30
OTS price $3.60

ACF Electronics Div., ACF Industries, Inc., Paramus, N. J.
RHO/RHO COMPUTER DISPLAY.
Final engineering rept.
Nov 63, 39p. Rept. no. RD64 10
Contract ARDS563, Proj. 115 033D
Unclassified report

Descriptors: (*Ground position indicators, Display systems), (*Navigation computers, Aircraft equipment), (*Display systems, Radio navigation), Distance-measuring equipment, Civil aviation, Commercial planes, Air traffic control systems, Instrument panels, Flight instrument, Data processing systems, Position finding, Electronic equipment, Design, Circuits, Navigation, Digital systems, Direction finding.

The RHO-RHO Computer Display is a combined pictorial display and course line computer operating from three DME inputs. Its place in the overall pictorial display evaluation program is merited by the higher accuracy of DME as compared with previous VORTAC pictorial displays. The equipment employs several design techniques for realizing the inherent accuracy of the input data; among these are slant range correction, use of sophisticated station selection circuitry to automatically and continuously selec the two stations which yield tracking data of the highest accuracy, ambiguity resolution circuits and use of high grade components. A comparison of this instrument with a RHO-RHO-Theta Display previously developed for the FAA indicates that the present unit achieves a greater measure of operational flexibility, similar accuracy, and increased probability of system operation at the cost of additional functional complexity. (Author)

AD-439 093 Div. 1, 18
OTS price $2.60

RAND Corp., Santa Monica, Calif.
PARASITING VERSUS AERIAL REFUELING FOR SUPPORT OF COMBAT AIRCRAFT,
by R. B. Murrow. Mar 64, 24p. Memo. no. RM3809PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Jet fighters, Refueling in flight), (*Jet fighters, Parasite planes), Ranges (Distance), Aerial warfare, Effectiveness, Analysis.

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Atlanta, Ga. 30300

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Chicago, Ill. 60616

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Cambridge, Mass. 02139

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Boulder, Colo. 80301

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Salt Lake City, Utah 84100

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Volume 37	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
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Volume 38	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50

For information regarding the availability of earlier indexes write to Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

AD-438 135 Div. 2
OTS price $7.60

Iowa State Univ. of Science and Tech., Ames.
ENVIRONMENT AND DISTRIBUTION OF THERMAL RELIEF FEATURES IN THE NORTHERN FOOTHILLS SECTION, ALASKA,
by Keith M. Hussey and Gary S. Anderson. June 63, 80p.
Unclassified report

Descriptors: (*Alaska, Climatology), (*Terrain, Analysis).

This paper is concerned with the environment and distribution of thermal relief features -- forms categorized in the existing literature as patterned ground, thermokarst, and various other features resulting from congeliturbation processes. It seems warranted to include all these features in the same study since their distribution is controlled by the same environmental factors and they, in turn, provide the same implications regarding climatic and edaphic conditions. (Author)

AD-438 168 Div. 2, 25
OTS price $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A MACHINE PROGRAM FOR COMPUTING NONLINEAR VISCOELASTIC WAVE PROPAGATION IN SOILS,
by Millicent M. Beck. Jan 64, 47p.
RDT & E Proj. 1M010501A006
BRL 1237 Unclassified report

Descriptors: (*Soils, Viscoelasticity), (*Stresses, Wave transmission), Propagation, Velocity, Strain (Mechanics), Functions, Time, Programming (Computers), Nonlinear systems, Shock waves, Nuclear explosions.

A numerical method and its machine program for calculating nonlinear viscoelastic wave propagation in soils are described. Solutions give particle velocity, stress and strain as functions of time and distance from the stress source. (Author)

AD-438 216 Div. 2
OTS price $1.60

RAND Corp., Santa Monica, Calif.
FORBIDDEN REGIONS FOR THE FORMATION OF CLOUDS IN A PLANETARY ATMOSPHERE,
by G. F. Schilling. Apr 64, 19p. Memo no. RM4084PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Upper atmosphere, Clouds), (*Atmosphere models, Clouds), (*Clouds, Upper atmosphere), Planetary atmospheres, High altitude, Thermodynamics, Water vapor, Vapor pressure.

Every model planetary atmosphere implicity establishes unique altitude distributions for the saturation vapor pressures of its minor constituents solely by relating ambient atmospheric pressures and temperatures to altitude. It is possible to determine for any model atmosphere those altitude regions where cloud formation due to condensation or sublimation of minor constituents is permitted or forbidden by basic thermodynamic laws, regardless of the amounts of the minor constituents present. As an example, this exclusion principle is applied to the formation of H2O clouds in the earth's upper atmosphere for conditions given by supplemental model atmospheres for latitudes 15 to 75 degrees. The specific results presented permit inferences with regard to the expected seasonal distribution of noctilucent clouds and serve generally to illustrate the application of a basic principle of thermodynamics to the study of planetary atmospheres. (Authorr)

AD-438 260 Div. 2, 25, 4
OTS price $11.50

Boeing Co., Seattle, Wash.
THE THERMODYNAMIC PROPERTIES OF AIR IN DISSOCIATION AND IONIZATION EQUILIBRIUM FROM 500 K TO 25,000 K,
by R. J. Arave. 6 Nov 61, 155p. Document no. D2 9909
Unclassified report

Descriptors: (*Air, Thermodynamics), Nitrogen, Oxygen, Nitrogen compounds, Oxides, Diatomic molecules, Ionization, Gases, Electrons, Density, Temperature, Computer languages, Equations, Enthalpy, Entropy.

The thermodynamic properties of air equilibrium are obtained by the methods of statistical thermodynamics. The species assumed possible in this model are N2, O2, NO, N, O, N+, O+, NO+ and e- electrons. These nine species constitute the major components of air and give results in very close agreement with much more elaborate models. The two independent variables are density and temperature. The FORTRAN program for the IBM 7090 digital computer is presented, also tables and graphs of the thermodynamic properties (covering a wide range of temperatures and densities) are indluded for completeness. (Author)

AD-438 413 Div. 2
OTS price $11.50

Liege Univ. (Belgium).
DETERMINATION OF SMOOTH DISTRIBUTIONS OF ATMOSPHERIC OZONE FROM THE ABSORPTION AND EMISSION OF THE 9.6 MICRONS BAND,
by E. Vigroux. 31 May 63, 160p. TN1
Contract AF61 514 962
AFCRL 64 88 Unclassified report

Descriptors: (*Ozone, Spectra (Infrared)), (*Atmosphere, Infrared radiation), Absorption, Absorption spectrum, Infrared spectroscopy, Water vapor, Carbon dioxide, Data, Tables.

The smoothed vertical distribution of atmospheric ozone is determined from observations in the infrared, at low dispersion, in the region of the 9.6 microns band. (Author)

AD-438 437 Div. 2, 25
OTS price $4.60

Rand Corp., Santa Monica, Calif.
THE PHYSICS OF METEOR ENTRY,
by Mary F. Romig. Apr 64, 43p. Rept. no. P 2902
Unclassified report

Descriptors: (*Meteors, Atmosphere entry), Hypersonic flow, Heat transfer, Ablation, Heat transfer coefficients, Meteorites, Gases, Density, Heating, Photographic analysis.

A survey is made of recent papers on the physics of meteor entry. The various regimes of luminous flight are defined, and present techniques for obtaining the mass and density of meteoroids are

Recent interest in large long-endurance support aircraft in a variety of roles, including those of tanker or mother support aircraft, makes it desirable to consider the question of parasiting versus aerial refueling on a general basis. Although detail is necessarily sacrificed, a simple, broad analysis is useful in delineating the general circumstances under which one or the other support method may be expected to be strongly preferable, as well as those for which neither method offers material advantage on the basis of the preference criteria used. This Memorandum presents a brief analysis of this type for one class of combat aircraft whose initial fuel loads are about half their gross weights. In general, aerial refueling is to be preferred for short support times or distances; parasiting for long support times or distances. (Author)

AD-439 351 Div. 1, 9
OTS price $6.60

Northrop Corp., Hawthorne, Calif.
IN-FLIGHT NOISE MEASUREMENTS PERFORMED ON THE X-21A LAMINAR FLOW AIRCRAFT.
by R. F. Carmichael and D. E. Pelke. Apr 64, 69p.
Rept. no. 64 81
Contract AF33 600 42052
Unclassified report

Descriptors: (*Boundary layer transitions, Airplane noise), (*Airplane noise, Boundary layer transitions), Laminar flow, Jet planes, Measurement, Instrumentation, Microphones, Turbulent boundary layer, Turbojet engines, Jet engine noise, Turbojet inlets, Research planes, Data, Compressor noise, Aerodynamic characteristics, Noise.

Sound pressure levels were measured in flight by six microphones positioned around the left hand wing of the X-21A laminar flow aircraft. These measurements define the noise levels existing at the wing surface for the Mach number ranges of the aircraft at three widely separated altitudes and four engine throttle settings. Most of the noise sources are identified, and it is shown that their levels compare favorably with previously developed prediction methods. It is noted, however, that not all predominating noise sources are included in the prediction methods, specifically, engine screech and one noise of undetermined orgin. It is also shown that engine noises are masked at higher Mach numbers by radiated turbulent boundary layer noise, which has the properties of noise generated by a quadrupole mechanism. In regards to the effects of noise on the maintenance of laminar flow, it is noted that noise spectra possessing intense, relatively narrow band spikes could be more detrimental than flat spectra with higher over-all levels. (Author)

AD-439 357 Div. 1, 14
OTS price $1.10

Schjeldahl (G. T.) Co., Northfield, Minn.
POLYPROPYLENE BALLOON STUDY.
Quarterly rept. no. 4, 1 Jan-31 Mar 64,
by J. A. MacFadden. 31 Mar 64, 10p.
Contract Nonr409600
Unclassified report

Descriptors: (*Balloons, Polyethylene plastics), (*Polyethylene plastics, Balloons), Manufacturing methods, Sealing compounds, Rupture, Mechanical properties, Payload, Tracking.

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-437 950 Div. 2
OTS price $4.60

Norwegian Meteorological Inst., Oslo.
STATISTICAL-DYNAMICAL METEOROLOGICAL PREDICTIONS.
Summary rept.,
by R. Fjortoft, and J. Nordo. 20 Jan 64, 46p.
Contract AF61 052 374
AFCRL 64 334 Unclassified report

Descriptors: (*Weather forecasting, Statistical analysis), (*Air mass analysis, Periodic variations), Atmospheric motion, Stability, Atmosphere models, Energy, Atmospheric temperature, Atmospheric pressure, Meteorological charts, Correlation techniques.

This investigation concerns the level of energy balance in the atmosphere. Previous work has shown that, for given external influences, total dissipation of kinetic energy, together with the amplitudes of the meridional temperature field and the large-scale disturbances, in a long-term balanced state, and in a highly simplified physical model, are uniquely determined by the horizontal scale of the large-scale disturbances. It is of interest to explore whether existing differences in horizontal scales are stable enough to explain significant year-to-year variations in the long-term balance. In a wider sense, taking also other kinematical characteristics into account, this is related to the problem of whether the atmosphere for given external influences assumes a number of quasi-stationary states besides oscillating around its seasonal climatological averages. Also of interest is the degree of coupling between different relevant parameters. This will make a statistical attack on the long-range forecasting problem more promising because of increased significance in the statistical formulae and because of greater stability. (Author)

AD-438 007 Div. 2
OTS price $11.00

Massachusetts Inst. of Tech., Cambridge.
ANGULAR MOMENTUM FLUX IN THE FORMATION OF THE SOLAR SYSTEM,
by Norman E. Gaut. 1 Feb 64, 133p. Rept. no. SR5
Contract AF19 628 2408, Proj. 8628, Task 862802
AFCRL 64 167 Unclassified report

Report on Planetary Circulations Project.

Descriptors: (*Solar systems, Theory), (*Reviews, History), Momentum, Planets, Sun.

The paper is divided into three sections. The first is an introduction. The second presents a comprehensive historical review of theories explaining the origin of the Solar System. Part three introduces the concept of gravitational torques and eddy transfer of angular momentum in a hypothetical model of a solar nebula. It is found that if a spiral asymmetry of the mass distribution is present, the gravitational torques of particles outside an imaginary radial wall, on those inside, tends to draw angular momentum radially outward. The eddy transport of angular momentum for the same distribution is found to be inward. The magnitude of the gravitational torque appears to dominate the advective rate of angular momentum flux but by less than one order of magnitude. (Author)

occurrence can supplement the rain gauge observations and aid in determining the rainfall distribution. Radar data obtained from Albrook Air Force Base, Canal Zone, were analyzed for April, 1961; July, 1961; and January, 1962. Monthly radar echo occurrence charts were drawn. From the analysis of these charts, areas of potentially high and low rainfall were determined. It was resolved from cross sections of radar echo occurrence and topography that no one meteorological process can explain the cloud formations in the Panama area. (Author)

AD-439 211 Div. 2
OTS price $4.60

Lichtklimatisches Observatorium, Arosa (Switzerland).
VERTICAL OZONE DISTRIBUTION OVER AROSA.
Rept. for Aug 62-July 63,
by Hans Ulrich Dutsch. Jan 64, 45p. Rept. no. TR2
Grant AF EOAR62 115
AFCRL 64 303 Unclassified report

Report on Vertical Ozone Distribution and Stratospheric Circulation. In cooperation with National Center for Atmospheric Research, Boulder, Colo.

Descriptors: (*Ozone, Switzerland), Distribution, Measurement, Atmosphere, Statistical analysis, Periodic variations, Stratosphere.

Umkehr data from another twelve months (August 1962 - July 1963) of routine observations at Arosa, Switzerland, were evaluated for vertical ozone distribution on an electronic computer. Mean values and some outstanding anomalies observed during the period are discussed. A set of earlier data (1956 - 1959) has been reevaluated using the same secondary scattering corrections as have been applied since observations were resumed in 1961. A short discussion of all the data and results is given. (Author)

AD-439 212 Div. 2
OTS price $2.60

Liege Univ. (Belgium).
RESULTS OF OBSERVATIONS ON ATMOSPHERIC OZONE BY THE INFRARED METHOD, DEDUCED FROM DATA OBTAINED IN AROSA (SWITZERLAND),
by E. Vigroux and A. Debaix. 31 May 63, 29p.
Rept. no. TN2
Contract AF61 514 962
AFCRL 64 89 Unclassified report

Descriptors: (*Atmosphere, Ozone), (*Ozone, Atmosphere), (*Infrared radiation, Measurement), Dibtribution, Analysis, Reliability, Sensitivity, Surfaces, Errors, Absorption, Emissivity, Meteorological instruments, Experimental data.

Vertical distributions of the atmospheric ozone have been deduced from the infrared observations made in Arosa from Janaury 1957 to November 1958. The results are used to find certain correlations. (Author)

AD-439 214 Div. 2
OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
MOTION IN THE VICINITY OF THE TRIANGULAR LIBRATION CENTERS,
by Andre Deprit. Oct 63, 42p. Document no. D1 82 0335; Math. note no. 338
Unclassified report
Also available from the author.

Descriptors: (*N-body problem, Motion), Tables, Numerical methods and procedures, Numerical analysis, Fourier analysis, Series, Orbital trajectories, Oscillation, Sun, Jupiter, Earth, Moon, Power series.

For the planar restricted problem of three bodies in the neighborhood of triangular equilbrium, angle coordinates and action moments are derived, which normalize the second order part of the Hamiltonian function. Consequently, short and long period elliptic oscillations of the first order can be extended into two families of periodic motions that exhibit the Dalembert characteristic, except for a denumerable set of critical mass ratios for which the long period librations are in resonance with the short period oscillations. For the Sun-Jupiter and Earth-Moon systems, terms up to the third order with regard to the orbital parameter have been computed and checked for the Fourier series of both families of periodic orbits. (Author)

AD-439 226 Div. 2
OTS price $7.60

Aerospace Information Div., Washington, D. C.
SKY ILLUMINATION DURING ECLIPSE. ANNOTATED BIBLIOGRAPHY OF SOVIET-BLOC LITERATURE FOR THE PERIOD 1940-1963.
17 Apr 64, 72p.
AID B64 20 Unclassified report

Descriptors: (*Bibliographies, Abstracting), (*Sky, Illumination), (*Documentation, USSR), Astronomy, Solar Eclipses.

AD-439 227 Div. 2
OTS price $1.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. COMPILATION OF ABSTRACTS FROM SOVIET LITERATURE.
Monthly rept. no. 44 for Jan 64.
24 Apr 64, 20p.
AID P64 30 Unclassified report

Descriptors: (*Upper atmosphere , Abstracts), (*Abstracts, Upper atmosphere), Bibliographies, Ionosphere, Electrons, Solar radiation, Van Allen radiation belt, Cosmic rays, Meteorology, Satellites (Artificial), Radio receivers, Ions, Intensity.

This is the forty-fourth in a series of monthly reports reviewing Soviet developments in selected problems in astrophysics and geophysics. It is based on materials received at the Aerospace Information Division in January 1964. Materials in this report deal with: (1) Ionospheric Electron Concentration; (2) Solar Radiation and the Ionosphere; (3) Van Allen Belts and Cosmic Rays; (4) Telluric Currents; (5) Meteorology of the Upper Atmosphere. (Author)

AD-439 228 Div. 2
OTS price $2.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. COMPILATION OF ABSTRACTS FROM SOVIET LITERATURE.
Monthly rept. no. 43 for Dec 63.
29 Apr 64, 22p.
AID P64 31 Unclassified report

Descriptors: (*Upper atmospheres, Bibliographies), USSR, Abstracts, Ionosphere, Solar radiation, Cosmic rays, Van Allen radiation belt, Nuclear explosions, Meteorology.

critically discussed. The effect of the assumed mode of heat transfer on the mass loss is shown for two recent fireballs. A relatively simple method for estimating original mass and velocity is presented. It is evident from this paper that many questions remain to be answered, particularly those concerning radiation from the gas and ablated material, before the entry of objects larger than those which produce telescopic meteors can be successfully analyzed. (Author)

AD-438 463 Div. 2
OTS price $3.60

Smith Coll., Northampton, Mass.
STUDY OF NEAR-SHORE BOTTOM PROFILES EAST AND SOUTHWEST OF POINT BARROW, ALASKA; COMPARISON OF PROFILES AND THE BARRIER ISLANDS IN THE POINT LAY AND PLOVER ISLANDS AREAS.
Final rept.
by Marshall Schalk. June 63, 32p.
Unclassified report

Descriptors: (*Ocean bottom, Analysis), (*Alaska, Ocean bottom sampling), Beaches, Chukchi sea, Islands, Transducers, Depth indicators, Recording systems, Diurnal variations, Mapping, Geology, Sedimentation, Gravel, Sand, Clay, Storms, Arctic regions.

AD-438 835 Div. 2
OTS price $1.60

National Meteorological Center, Weather Bureau, Washington, D. C.
SUMMARY OF VERIFICATION OF NUMERICAL OPERATIONAL TROPICAL CYCLONE FORECAST TRACKS FOR 1963.
by Lloyd W. Vanderman. Feb 64, 18p.
WB NMC TM29 Unclassified report

Descriptors: (*Cyclones, Weather forecasting), Hurricane tracking, Atlantic Ocean, Mexico Gulf, Tropical cyclones.

AD-438 843 Div. 2
OTS price $2.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
SCALE OF STRATOSPHERIC DETAIL STRUCTURE,
by Willis L. Webb. Apr 64, 21p.
DA Task 1G6 50212A127 03
AERDA 130 Unclassified report

Descriptors: (*Stratosphere, Atmospheric sounding), Wind, Temperature, Meteorology, Rockets, Networks, Thickness, Sounding rockets.

Sensitivities of wind and temperature measuring systems employed in the Meteorological Rocket Network are adequate to provide vertical detail structure information on a scale of the order of a few hundred meters in the stratosphere. In a few instances, data in the horizontal plane have been obtained with sensitivities of the order of a few kilometers. The wind data have been analyzed and discussed in the light of existing theories of the functional characteristics of the stratosphere as a medium for the generation and/or transportation of an energy flux, particularly of the type characteristized by pressure perturbations. The results are consistent with both modes of operation, illustrating features to be expected in the propagation of internal waves, and also illustrating evidence of internal generation of the detail structure in the upper stratosphere. (Author)

AD-438 918 Div. 2, 12
OTS price $7.60

Texas A. and M. Coll., College Station.
SATELLITE PHOTOGRAPHY AS A MEANS OF EVALUATING THE EQUATIONS OF VERTICAL MOTION,
by John Hansen. Aug 63, 72p.
Unclassified report

Master's thesis. Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Meteorological satellites, Photography), (*Atmospheric motion, Air mass analysis), United States, Clouds, Cloud cover, Meteorological charts, Wind, Air, Density, Velocity.

Vertical motions over the western and central United States during a three-day period in August 1961 were computed by several methods. The resulting analyses, applicable at 700 mb or 10,000 ft (600 mb for the JNWP vertical motion fields), were compared both subjectively and objectively to each other and to approximately synoptic TIROS nephanalyses. The results of the comparisons showed only moderate agreement among the various methods and between the vertical-motion analyses and the TIROS information. The kinematic method, based on observed winds, appeared to give the best agreement with the satellite picture indications of vertical motion, though it seemed little better than some of the other methods. The use of satellite data shows definite promise as a means of evaluating computed vertical-motion fields and should eventually contribute to improvement of the procedures used to compute vertical motions. (Author)

AD-438 949 Div. 2
OTS price $1.10

High Altitude Observatory, Boulder, Colo.
(No title).
Status rept. no. 7 (Annual summary) for 16 Apr 64.
16 Apr 64, 4p.
Contract Nonr39305
Unclassified report

Descriptors: (*Solar corona, Analysis), Instrumentation, Design, Light, Diffraction, Meteorological balloons, Polyethylene plastics, Calibration, Research program administration.

AD-438 951 Div. 2
OTS price $5.60

Texas A and M U., College Station.
CLIMATOLOGICAL STUDY OF RADAR ECHO PICTURES FROM ALBROOK AIR FORCE BASE, PANAMA,
by Christopher Bowen. May 64, 58p.
Unclassified report

Master's Thesis.

Descriptors: (*Climatology, Panama), (*Radar echo areas, Air mass analysis), Clouds, Photography, Radar recording cameras, Meteorological charts, Rainfall, Programming (Computers), Data, Maps, Distribution.

The Isthmus of Panama has numerous rainfall recording stations; however, they are unevenly distributed with most of them being located close to the Canal Zone. Thismakes it impossible to determine accurately the distribution of rainfall in regions outside the Canal Zone. A climatological study of radar echo

AD-439 415 Div. 2
OTS price $2.60

Travelers Research Center, Inc., Hartford, Conn.
WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM.
Monthly progress rept. for Apr 64.
Apr 64, 21p.
Contract Cwb10704

Unclassified report

Descriptors: (*Weather forecasting, Statistical analysis), Mathematical prediction, Programming (Computers).

AD-439 416 Div. 2
OTS price $2.60

GM Defense Research Labs., Santa Barbara, Calif.
DIRECTIONAL, SPECTRAL, AND STATISTICAL PROPERTIES OF THE UNDER-ICE NOISE IN THE ARCTIC,
by C. R. Greene and B. M. Buck. Mar 64, 23p.
Rept. no. TR64 22
Contract Nonr374400

Unclassified report

Descriptors: (*Hydrophones, Design), (*Underwater sound, Arctic Ocean), Noise, Ice, Arctic regions, Background, Pressure, Wind, Correlation techniques.

Results of the analysis of ambient noise recordings are presented. The average pressure spectrum level observed over the 15-day period was about 5 db over Knudsen's sea state zero extended. As a function of time, the pressure spectrum level correlated significantly with wind speed. There was little difference in ambient noise received by vertical seismometers in thick ice or thin ice. Crosscorrelation of horizontally spaced hydrophones showed that the noise was anisotropic in azimuth, and that the degree of anisotropy was correlated with wind speed delayed by one day. The amplitude probability density function was found to be non-normal by virtue of higher probabilities for high amplitude noise, although this was less for periods of low noise or deep hydrophones than for high noise or shallow hydrophones. (Author)

AD-439 422 Div. 2, 25
OTS price $8.10

United Electrodynamics, Inc., Pasadena, Calif.
IDENTIFICATION AND ELIMINATION OF MICROSEISM NOISE AT DEPTH USING THEORETICAL RAYLEIGH WAVE AND OBSERVED NOISE DILATATION.
Final rept. suppl.,
by Charles B. Archambeau, Shelton S. Alexander, and Elaine E. Biehler. 1964, 88p. Rept. no. ER642 31
Contract AF33 600 42927

Unclassified report

Suppl. to AD-347 208.

Descriptors: (*Microseisms, Noise), Propagation, Pressure, Detectors, Recording systems, Measurement, Theory, Analysis, Depth finding, Identification, Tests.

AD-439 434 Div. 2, 25
OTS price $8.10

Boeing Scientific Research Lab., Seattle, Wash.
RADIATIVE TRANSPORT OF HEAT IN LUNAR AND PLANETARY INTERIORS.
by Zdenek Kopal. Jan 64, 88p. Document no. D1 82 0328

Unclassified report

In cooperation with Manchester Univ. (England). Also available from the author.

Descriptors: (*Thermal conductivity, Planets), (*Emissivity, Lunar environment), Heat transfer, Fourier analysis, Green's function, Moon, Surfaces, Specific heat, Temperature, Boundary value problems, Differential equations.

The aim of the present investigation has been to formulate and solve the problem of the radiative transfer of energy in solid globes of planetary size - both in their interiors as well as surface layers - with the radiative loss into space taken into account. Following a general statement of this problem in the introductory section, the time-dependent partial differential equation of radiative transfer has been formulated in terms of spherical polar coordinates, and a method developed which permits the construction of a solution of this equation, to an arbitrary order of accuracy, both for the emissivity or temperature as the dependent variable. In the latter case, the well-known equation of heat conduction is shown to obtain as a limiting case if the mean free path of the energy-carrying photons tends to zero. (Author)

AD-439 482 Div. 2
OTS price $1.60

High Altitude Observatory, Boulder, Colo.
FLARE PREDICTION FROM SOLAR LIMB OBSERVATIONS,
by Lorne Avery and Donald E. Billings. 5 May 64, 17p. Rept. no. AG M163
Contract Nonr39306

Unclassified report

Descriptors: (*Solar flares, Mathematical prediction), Doppler effect, Solar spectrum, Line spectrum, Intensity, Solar atmosphere.

Some preliminary results are outlined based on the study of solar east limb features with a view to flare forecasting. The advantage of any prediction method based on such data is that information will be available at least two days earlier than could be expected from disc observations. (Author)

AD-439 510 Div. 2
OTS price $10.10

Indiana Univ., Bloomington.
VISIBILITY CONDITIONS IN MALAYA,
by Don C. Bennett and Richard D. Smith. 25 Mar 63, 122p.
Contract DA19 129QM1582, Proj. 7 83 01 006

Unclassified report

Descriptors: (*Climatology, Malaya), (*Visibility, Malaya), Haze, Atmospheric precipitation, Plants (Botany), Fog, Light, Cloud cover.

AD-439 651 Div. 2, 4
OTS price $1.10

Queen's Univ., Belfast (Northern Ireland).
CHEMICAL REACTIONS CONTRIBUTING TO THE NIGHTGLOW,
by D. R. Bates. 8 Jan 64, 5p.
Grant AF EOAR63 85
AFCRL 64 369 Unclassified report

Descriptors: (*Night sky, Luminescence), (*Sky brightness, Night sky), (*Luminescence, Night sky), Chemical reactions, Recombination reactions, Excitation, Emissivity, Reaction kinetics, Oxygen, Nitrogen, Sodium compounds, Theory, Eire.

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

Topics covered in this report are as follows: Solar radiation and the ionosphere, Van Allen belts and cosmic rays, Nuclear bursts in the atmosphere, and Meteorology of the upper atmosphere. (Author)

AD-439 248 Div. 2
OTS price $14.50

Massachusetts Institure of Tech., Cambridge.
STRATOSPHERIC WIND TEMPERATURE AND ISOBARIC HEIGHT CONDITIONS DURING THE IGY PERIOD PART II,
by Li Peng. 15 Dec 63, 213p. Rept. no. 10
Contract AF19 604 5223
Unclassified report

Report on Planetary Circulations Project.

Descriptors: (*Meteorological parameters, Analysis), Tables, Meteorological charts, Seasonal variations, Wind, Temperature, Barometric pressure, Heat, Transport properties, Energy, Momentum.

The stratospheric wind, temperature and isobaric height conditions of the Northern Hemisphere during the period from January to June 1958 are analyzed in detail. Three month seasonal averages of these quantities and of the correlations between them are computed and presented in the form of hemisphere maps. Zonal averages of various important quantities are also given in tables. A general discussion of the results from the viewpoint of energy and mementum is given briefly. (Author)

AD-439 290 Div. 2
OTS price $15.00

Naval Weapons Lab., Dahlgren, Va.
CLIMATOLOGICAL DENSITY DATA FOR FORTY EURASIAN STATIONS,
by Myrtle D. France. 23 Mar 64, 230p.
NWL 1909 Unclassified report

Descriptors: (*Climatology, Weather stations), (*Density, Data), Tables, Europe, Asia, Meteorological parameters, Wind, Atmosphere, Seasonal variations.

Seasonal climatological density data for 40 Eurasian stations, together with monthly climatological density data for three of the 40 stations, are presented in this report. Tabulations of means, standard deviations, and correlation coefficients by geometric altitudes from surface to 20643 meters are given. These tabulations are based on statistical data obtained from observations extending over approximately five years in the period January 1953 to August 1962. For purposes of description, graphical presentations of typical data are given for selected cases. These data were obtained from compilations and computations by the National Weather Records Center, Asheville, North Carolina. (Author)

AD-439 330 Div. 2, 12
OTS price $18.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
COSMIC RESEARCH (Kosmicheskiye Issledovaniya).
27 Apr 64, 292p.
FTD TT64 499 Unclassified report

Trans. from Akademiya Nauk SSSR, 2:1, pp. 3-174, 1964.

Descriptors: (*Space flight, Scientific research), (*Astrophysics, Scientific research), USSR, Satelittes (Artificial), Stability, Magnetic fields, Charged particles, Radiation effects, Shock waves, Gases, Infrared radiation, Clouds, Measurement, Radiological dosage.

AD-439 336 Div. 2, 25
OTS price $1.10

RAND Corp., Santa Monica, Calif.
STRANGE SOUNDS FROM THE SKY,
by Mary F. Romig and Donald L. Lamar. Apr 64, 8p.
Rept. no. P 2894
Unclassified report

Descriptors: (*Meteors, Sound), Theory, Electromagnetic waves, Electric discharges, Sky, Atmosphere.

AD-439 350 Div. 2
OTS price $1.60

Manchester Univ. (England).
THE DETERMINATION OF THE ACCURATE POSITIONS OF RADIO STARS BY THE LUNAR OCCULTATION TECHNIQUE. OBSERVATIONS OF GALACTIC AND EXTRA-GALACTIC EMISSION AT 408 Mc/s.
Progress rept. no. 1, Oct-Dec 63,
by Conrad H. Slater, C. G. T. Haslam and M. J. S. Quigley. Dec 63, 11p.
Contract N62558 3928
Unclassified report

Descriptors: (*Stars, Radio astronomy), (*Radio astronomy, Stars), Position finding, Moon, Galaxies, Emissivity, Ultrahigh frequency Density, Diffraction, Telescopes, Errors, Wind, Intensity, Programming (Computers).

AD-439 354 Div. 2
OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADIO-ECHO STUDIES OF METEORS AT 68-cm WAVELENGTH. PART I: SPORADIC METEORS,
by J. V. Evans and R. A. Brockelman. 29 Oct 63, 64p. Rept. no. TR332
Contract AF19 628 500
ESD TDR63 581 Unclassified report

Descriptors: (*Meteors, Radio waves), (*Radio waves, Reflection), Velocity, Experimental data, Intensity, Height finding, Fragmentation, Analysis, Distribution, Functions, Cylindrical bodies, Ionization, Particles, Radio signals.

Radio-echo observations of meteors at 68 cm are described. Details are given of the equipment and of the data collection and reduction procedures. Sufficient information was gathered to permit the computation of the velocity, height, duration, and intensity for most of the meteors. The interrelation of these quantities is explored. The principle conclusions reached are: that the meteors recorded at this short wavelength are seen over a height range not sensibly different from that at long wavelengths, the effective scattering lengths of the trails are short (50 meters), the over-all lengths of the trails average 6 to 7 km, and (evidence of fragmentation is found in about 50% of the meteors observed. The visual magnitude of these meteors has been estimated from their rate and corresponds to +8. The short effective scattering length is attributed to a rapid initial expansion of the trail diameter. (Author)

um borohydride, aluminum, magnesium, and calcium and its alloys. Organic additives in the form of binders or color intensifiers generally do not decrease and may increase sensitivity to both impact and friction when used in moderate amounts. (Author)

AD-439 398 Div. 3, 16
OTS price $1.60

Midwest Research Inst., Kansas City, Mo.
RESEARCH, DEVELOPMENT AND FABRICATION OF AN EXPENDABLE BIOELECTROCHEMICAL DETECTOR SYSTEM.
Bimonthly progress rept. no. 6, 1 Feb-31 Mar 64, by Elven K. Bauman. 7 May 64, 14p.
Contract DA18 108AMC120A, MRI Proj. 2688B
Unclassified report

Descriptors: (*Electrochemistry, Instrumentation), (*Chemical warfare agents Detectors), (*Detectors, Design), Operation, Temperature, Aerosol generators, Enzymes, Hydrolysis, Voltage.

This report describes the fabrication of two experimental detectors and preliminary operation of one of these at 4, 25, and 60 C. Enzyme hydrolysis at the extreme temperatures was normal except however, a shift of safe voltage was observed. The voltage resulting from contact of the enzymatically hydrolyzed substrate with the electrodes fell during exposure to high temperature and rose during the low-temperature experiment. Additional studies are now needed to determine the effect of temperature extremes on detector operation. A shift of emphasis from obtaining maximum voltage change to obtaining minimum response time is suggested and suitable experiments are outlined. (Author)

AD-439 688 Div. 2
OTS price $1.60

Queen's U., Belfast (Northern Ireland).
OBSERVATIONS OF THE 6300-ANGSTROM OI EMISSION OF THE NIGHTGLOW WITH A PRESSURE SCANNING FABRY-PEROT INTERFEROMETER,
by A. H. Jarrett, M. J. Hoey and L. Paffrath.
1964, 16p.
Grant AF EOAR63 85
AFCRL 64 370 Unclassified report

Descriptors: (*Night sky, Interferometers), Aurorae, Temperature, Curve fitting.

AD-439 691 Div. 2
OTS price $21.00

Acoustics and Seismics Lab., Univ. of Michigan, Ann Arbor.
HANDBOOK: WORLD-WIDE STANDARD SEISMOGRAPH NETWORK.
Apr 64, 377p.
Unclassified report

Descriptors: (*Seismological stations, Handbooks), Seismographs, Instrumentation, Laboratory equipment, Photographs.

This report is a compilation of information about each of the 75 stations in the World-Wide Cooperative Standard Seismograph Network as of June 1963. This information includes material on each station's location and facilities, environment, vault and pier construction, and instrumentation. Maps, diagrams, and photographs supplement the text.

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-437 978 Div. 3, 10
OTS price $7.60

Naval Ammunition Depot, Crane, Ind.
INVESTIGATION OF THE BURNING CHARACTERISTICS OF THE LEAD DIOXIDE-CUPRIC OXIDE-SILICON STARTER COMPOSITION.
Rept. for Apr 63-Feb 64,
by William Ripley. 26 Mar 64, 71p.
NADC C1 RDTR41 Unclassified report

Descriptors: (*Pyrotechnics, Markers), (*Oxides, Markers), (*Markers, Materials), Copper compounds, Silicon, Lead compounds, Dioxides, Heat of reaction, Pressure, Time, Oxidizers, Particle size, Heat transfer, Ignition, Tables, Calorimeters, Burning rate, Combustion.

A study is made of the burning characteristics of a statistical family of 16 fuel-rich combinations of the lead dioxide-cupric oxide-silicon starter mix system. Factors that determine the behavior and predictability of the system are defined and investigated by calorimetry, pressure-time curve studies and other techniques. The burning characteristics required for optimum performance as a starter composition are considered. (Author)

AD-438 782 Div. 3, 18
OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
IMPROVISED PYROTECHNIC MIXTURES FOR GUERRILLA WARFARE APPLICATIONS,
by Bossie Jackson, Jr. and Seymour M. Kaye.
Apr 64, 19p.
Proj. 1A542703D346
PA TM1280 Unclassified report

Descriptors: (*Guerrilla warfare, Pyrotechnics), (*Pyrotechnics, Guerrilla warfare), (*Incendiary mixtures, Guerrilla warfare), Ignition, Demolitions, Test vehicles, Aluminum, Sodium compounds, Potassium compounds, Perchlorates, Nitrates, Sulfur, Ammonium compounds, Chlorides, Iron compounds, Sulfides, Oxides, Magnesium, Iron, Powder metals, Charcoal, Coal, Wood, Oils.

A series of pyrotechnic formulations developed from readily available constituents for use in guerrilla warfare were evaluated. The systems were tested under confinement provided by two test vehicles consisting of short sections of cast iron pipe, one having a 2-in. inside diameter and the other a 1-in. inside diameter. Both were threaded and sealed at both ends with caps, with either Laminac 4116 resin or Duco cement as the sealing compound. Initiation was accomplished by placing either commercial quickmatch or a J-2 blasting cap through a perforation in the top cap. Performance was graded in accordance with the system's capability of reacting completely and the degree of fragmentation of the test vehicle. A number of systems, such as 90/100 potassium chlorate/petrolatum, 71/29 potassium nitrate/grains of wood, and 25/50/25 sodium nitrate/ammonium nitrate/sawdust, were found suitable for guerrilla warfare on the basis of field tests. (Author)

AD-439 383 Div. 3, 14
OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
SURVEY OF SENSITIVITY CHARACTERISTICS OF TYPICAL DELAY, IGNITER, FLASH, AND SIGNAL TYPE PYROTECHNIC COMPOSITIONS,
by Joseph Kristal and Seymour M. Kaye. Apr 64, 18p.
Proj. 1C 52380 A302
PA TM 1316 Unclassified report

Descriptors: (*Pyrotechnics, Sensitivity), (*Reviews, Pyrotechnics), Visual signals, Silicon, Oxidizers, Friction, Impact shock, Fuels, Additives, Binders, Aluminum, Boron, Calcium, Calcium alloys, Calcium compounds, Magnesium alloys, Hydrides, Potassium, Barium compounds, Magnesium, Borohydrides, Potassium compounds, Zirconium, Zirconium compounds, Zirconium alloys, Nickel alloys, Percholates, Nitrates, Oxides, Chlorates, Chromates, Polymers, Igniters, Powders.

Pyrotechnic compositions which have delay, igniter, flash, and signal applications were submitted for investigation with regard to their impact and friction sensitivity characteristics. Impact tests were conducted in accordance with the technique described in Technical Report FRL-TR-25 except that the samples were tested as received, without performing the granulation specified. Friction tests were conducted in accordance with the procedure outlined in Picatinny Arsenal Testing Manual 7-1. Extreme sensitivity to both the friction and impact tests was found to be a function of the particular ingredients and the particle size of those ingredients. In general, the perchlorate containing compositions were found to be extremely sensitive to both friction and impact. The same is generally true of compositions containing finely divided fuels such as boron, zirconium, potassi-

AD-438 188 Div. 4
OTS price $1.60

Calvin Coll., Grand Rapids, Mich.
THE FORMATION OF THIN ANODIC FILMS OF SILVER OXIDE,
by Thedford P. Dirkse and J. Barry De Roos.
1 Jan 64, 15p. Rept. no. TR1
Contract Nonr168202, Proj. NR359 364
Unclassified report

Descriptors: (*Films, Electroforming), (*Silver compounds, Oxides), (*Electrodeposition, Silver compounds), Electrochemistry, Electrodes, Anodes (Electrolytic cell), Silver, Electrolytes, Potassium compounds, Hydroxides, Electric currents, Electrical conductance.

The formation of thin anodic films of silver oxide was studied by means of a constant current technique. The results indicate that this is a diffusion-controlled process involving the hydroxide ion. The study was carried out at room temperature and over a range of potassium hydroxide concentrations. (Author)

AD-438 223 Div. 4
OTS price $2.60

California Inst. of Tech., Pasadena.
TEMPERATURE EFFECTS IN CAVITATION DAMAGE,
by Robert E. Devine and Milton S. Plesset.
Apr 64, 26p. Rept. no. 85 27
Contract Nonr220 28
Unclassified report

Descriptors: (*Cavitation, Damage), Materials, Temperature, Bubbles, Solutions, Buffers, Bases (Chemistry), Oscillation, Magnetostructure elements, Transducers, Air, Liquids, Vapor pressure, Solutions, Water, Sodium compounds, Chlorides.

Cavitation damage is studied for several materials over a range of temperatures in the cavitating liquid from 0 C to 90 C. The cavitating liquids used were distilled water, distilled water buffered to pH 8, and a 3 percent solution of NaCl in distilled water. The cavitation damage was produced by continuous oscillation of the test specimens with a magnetostrictive transducer, so that long term chemical effects tended to be suppressed. It is found that a maximum in the damage rate occurs at temperatures in the range 40 C to 50 C, and that the maximum is independent of the material. The damage in this laboratory procedure appears to correlate directly with the change in vapor pressure of the liquid and inversely with the concentration of dissolved air. (Author)

AD-438 297 Div. 4, 25
OTS price $1.10

California U., Berkeley.
INFRARED STUDIES OF FREE RADICALS AND UNSTABLE REACTION INTERMEDIATES.
Final rept., 1 Jul 56-28 Feb 61,
by George C. Pimentel. 28 Feb 61, 8p.
Contract AF49 638 1
AFOSR 1302 Unclassified report

Descriptors: Free radicals, Spectra (Infrared)), (*Photolysis, Nitrogen compounds), Azides, Nitrates, Alkanes, Nitrites, Esters, Argon, Solidified gases, Cryogenics, Acids, Nitrogen, Halogenated hydrocarbons, Iodine compounds, Monocyclic compounds, Organic nitrogen compounds, N-heterocyclic compounds.

AD-438 396 Div. 4
OTS price $1.60

Stanford Univ., Calif.
FACTORS INVOLVED IN THE STABILITY OF CYCLOPROPANES.
Final technical rept., 1 Oct 61-30 Sep 63,
by R. H. Eastman. 30 Sep 63, 15p.
Grant AF AFOSR62 116
AFOSR 64 0843 Unclassified report

Descriptors: (*Polycyclic compounds, Stereochemistry), (*Stereochemistry, Polycyclic compounds), Cycloalkanes, Chemical equilibrium, Molecular structure, Carboxylic acids, Anhydrides, Chemical bonds, Molecular isomerism, Molecular spectroscopy, Optical properties, Pyrolysis, Stability, Photolysis, Terpenes, Nuclear magnetic resonance, Spectra (Visible and ultraviolet), Valence, Dibasic acids, Aromatic compounds.

The following dissertations are summarized: A Study of Electronic Effects on a Ring-chain Equilibrium; Evidence Against Conjugation Effects in Phenylcyclopropanes; Valence Bond Isomerization in the Bicyclo (3.1.0) Hexene Series. (Author)

AD-438 411 Div. 4, 25
OTS price $1.60

Bonn Univ. (Germany).
FLASH PHOTOLYSIS AND FLUORESCENCE OF NH3 IN THE VACUUM ULTRAVIOLET,
by K. H. Becker, F. Stuhl and K. H. Welge.
1962, 13p.
Grant AF EOAR62 73
Unclassified report

Descriptors: (*Ammonia, Photolysis), (*Photolysis, Ammonia), (*Fluorescence, Ammonia), Dissociation, Ionization, Free radicals, Electron transitions, Absorption spectra, Low-pressure research, Ultraviolet radiation, Spectra (Visible and ultraviolet), Molecular spectroscopy, West Germany.

AD-438 412 Div. 4
OTS price $1.10

Bonn Univ. (Germany).
MASS-SPECTROMETRIC INVESTIGATION OF THE PHOTOIONIZATION OF THE NITROGEN MOLECULE,
by F. J. Comes and W. Lessmann. 1962, 10p.
Unclassified report

Descriptors: (*Nitrogen, Photolysis), (*Mass spectroscopy, Nitrogen), (*Photolysis, Nitrogen), Molecules, Ionization, Dissociation, Ions, Excitation, Ultraviolet radiation, West Germany.

AD-438 456 Div. 4, 25
OTS price $1.60

Bonn Univ. (Germany).
PHOTODISSOCIATION AND FLUORESCENCE IN THE SCHUMANN-UV,
by K. Beyer and K. H. Welge. 1963, 15p.
Grant AF EOAR62 73
Unclassified report

Descriptors: (*Fluorescence, Photolysis), (*Dissociation, Fluorescence), (*Photolysis, Fluorescence), Ultraviolet radiation, Gases, Oxygen, Hydrogen, Nitrogen, Carbon dioxide,

4. CHEMISTRY

AD-437 945 Div. 4
OTS price $8.10

Minnesota Mining and Mfg. Co., St. Paul.
ARCTIC RUBBER.
Final rept., 24 Aug 60-23 Dec 62,
by H. A. Brown, N. Knoll and D. E. Rice.
23 Dec 62, 82p.
Contract DA19 129qm1684
Unclassified report

Descriptors: (*Synthetic rubber, Synthesis (Chemistry)), (*Polymers, Synthetic rubber), Organic nitrogen compounds, Fluorine compounds, Tensile properties, Cold weather tests, Aging (Materials), Heat, Stability, Anhydrides, Oxides, Nitrogen compounds, Acetates, Copolymerization, Fatty acids, Nitrates, Spectra (Infrared), Nuclear magnetic resonance, N-heterocyclic compounds, O-heterocyclic compounds, Amines, Alkanes, Hydrazine, Halogenated hydrocarbons, Chromium compounds, Vulcanization, Oxygen compounds, Magnesium compounds, Cadmium compounds, Manganese compounds, Zinc compounds, Hydroxides, Calcium compounds, Strontium compounds, Polymerization.

AD-437 960 Div. 4, 14, 30
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
SYNTHESIS OF LINEAR AND CYCLOLINEAR ORGANOSILICON COMPOUNDS WITH PHENYLENESILOXANE CHAINS IN THE MOLECULES,
by V. E. Nikitenkov, tr. by Ingeborg V. Baker.
10 Apr 64, 12p.
RSIC 158 Unclassified report

Trans. from Vysokomolekularnye Soyedinyeniya, 4:1, pp. 105-108, 1962.

Descriptors: (*Silicon compounds, Polymerization), (*Siloxanes, Synthesis (Chemistry)), USSR, Organic compounds, Chemical reactions, Polymers, Molecular structure, Metalorganic compounds.

AD-437 962 Div. 4
OTS price $4.60

Joint Publications Research Service, Washington, D. C.
LINEAR POLYFLUORINATED ANALAGOUSLY BIFUNCTIONAL COMPOUNDS AS POTENTIAL MONOMERS,
by V. V. Shokina. 22 Apr 64, 45p.
RSIC 165 Unclassified report

Trans. from Uspekhi Khimii, 32:9, pp. 1052-1086, 1963.

Descriptors: (*Fluorine compounds, Synthesis (Chemistry)), (*Halogenated hydrocarbons, Fluorine compounds), (*Organic nitrogen compounds, Fluorine compounds), Polymerization, Polymers, Condensation reactions, Alkenes, Glycols, Esters, Ketones, Carboxylic acids, Amides, Amines, Nitriles, Nitrates, Anhydrides, Tables, USSR.

AD-437 996 Div. 4, 14
OTS price $3.60

Peninsular Chemresearch, Inc., Gainesville, Fla.
SYNTHESIS AND POLYMERIZATION OF FLUORINATED SULFUR MODIFIED NITROSO RUBBER.
Quarterly rept. no. 1, 1 Jul-30 Sep 63,
by Eugene C. Stump and Calvin D. Padgett.
21 Oct 63, 33p.
Contract DA19 129AMC152N
Unclassified report

Descriptors: (*Synthetic rubber, Polymerization), (*Polymerization, Fluorine compounds), Organic nitrogen compounds, Chlorine compounds, Nitrogen compounds, Sulfides, Nitrates, Oxygen compounds, Chromatographic analysis, Spectra (Infrared), Sulfur compounds, Alkanes, Aromatic compounds, Organic sulfur compounds, Thiols, Silver compounds, Metalorganic compounds, Halogenated hydrocarbons, Synthesis (Chemistry).

AD-438 163 Div. 4
OTS price $5.60

Dynatech Corp., Cambridge, Mass.
STUDY OF OXIDES FOR O2 - N2 SEPARATION.
Quarterly progress rept. no. 5, 15 Jan-15 Apr 64, 30 Apr 64, 58p. Rept. no. 471
Contract AF33 657 10797
Unclassified report

Descriptors: (*Cobalt compounds, Oxides), (*Particles, Cobalt compounds), (*Separation, Cobalt compounds), Oxygen, Nitrogen, Air, Spheres, Oixdation, Reaction kinetics, Manufacturing methods, Extrusion, Pressure, Roll, Palladium, Contamination, Wire, Sintering, Surface properties, Porosity.

Contents: Cobalt oxide oxidation and regeneration studies-Cobalt oxide oxidation studies, Comparison of oxidation rate data, Long time osidation tests on materials of controlled grain structure, Cobalt oxide regeneration studies, Particle Development- Unsupported Cobalt Oxide particle development, Summary of previous work on rolled spheres, Particles made from pressed tablets, Particles made from extruded pastes, Direction of current efforts, Coated particle development, Supported CoO Particles, Supported palladium particles; Effect of high temperature alloy contaminants on cobalt oxide reactant particles. (Author)

AD-438 187 Div. 4, 14
OTS price $3.60

United States Rubber Co., Wayne, N. J.
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES.
Quarterly rept. no. 2, 1 Feb-30 Apr 64,
by Harold K. Garner, Gerald J. Klender and Aspet Merijanian. 30 Apr 64, 34p.
Contract NObs90089, Proj. SR007 03 03, Task 1000
Unclassified report

Descriptors: (*Thermoplastics, Synthesis (Chemistry)), (*Organic phosphorus compounds, Thermosetting plastics), Organic nitrogen compounds, Ethers, Heat-resistant plastics, Spectra (Infrared), Nuclear magnetic resonance, Aromatic compounds, Amines, Quinones, Chlorine compounds, Phenols, Stability, Heat.

The objective of this investigation is the development of new thermoplastic and thermosetting resins from phosphonitrilic chloride trimer for high temperature electrical applications. A polymer from P3N3(Oc6H5)3.5(OC2H5)1.25C11.25 was prepared and submitted to the New York Naval Shipyard for evaluation. Work was done on phenyl, phenoxy, and dimethylamino blocked monomers, and on the copolymerization of phosphonitriles with hydroquinone. A tetrahydroxy benzene derivative was reacted with P3N3(C6H5)2C14. (Author)

try), Molecular spectroscopy, Absorption spectra, Spectra (Visible and ultraviolet), Chemical reactions, Complex compounds, Chemical properties.

The open literature for the period 1937 through 1963 was searched for all references on the subject of aluminum hydride. Many of the references have proved to be somewhat erroneous in their conclusions in the light of present day knowledge on the subject. However, for completeness all are included. The references are listed chronologically by year. The title of the investigation is listed under each reference. Brief pertinent data are included where available. (Author)

AD-439 314 Div. 4, 16
OTS price $1.10

Kitasato Inst. (Japan).
EXPLORATION OF NEW CHERMOTHERAPEUTICS FOR INFECTIOUS DISEASES.
Quarterly rept. no. 1, 27 Oct 61-31 Jan 62,
by Toju Hata. 31 Jan 62, 4p.
Contract DA92 557FEC35675
Unclassified report

Descriptors: (*Antibiotics, Molecular structure), (*Decomposition, Antibiotics), Chromatographic analysis, Electrophoresis, Japan.

AD-439 315 Div. 4, 16
OTS price $1.10

Kitasato Inst. (Japan).
EXPLORATION OF NEW CHERMOTHERAPEUTICS FOR INFECTIOUS DISEASES.
Quarterly rept. no. 2, 1 Feb-30 Apr 62,
by Toja Hata. 30 Apr 62, 7p.
Contract DA92 557FEC35675
Unclassified report

Descriptors: (*Scientific research, Japan), (*Antibiotics, Molecular structure), (*Decomposition, Antibiotics), Peptides, Amino acids, Chromatographic analysis.

AD-439 402 Div. 4
OTS price $7.60

Regis Chemical Co., Chicago, Ill.
THE SYNTHESIS OF NON-COMMERCIALLY AVAILABLE ORGANIC COMPOUNDS.
Annual technical rept. 1 Sep 62-31 Jan 64,
by Charles A. Feit, Eugene R. Carr and Richard W. Shubart. 25 Feb 64, 74p.
Contract DA18 108CML6625
Unclassified report

Descriptors: (*Ketones, Polycyclic compounds), (*N-heterocyclic compounds, Synthesis (Chemistry)), (*Polycyclic compounds, Ketones), Pyrroles, Piperidines, Esters, Carboxylic acids, Alcohols, Nitriles, Acetates, Spectra (Infrared), Chromatographic analysis, Refractive index, Molecular structure.

The purpose of this contract was to synthesize non-commercially available organic chemicals for investigators at the Army Chemical Research and Development Laboratories, Edgewood Arsenal, Maryland. In the main, the assigned compounds were bridged bicyclic aminoketones; with a few exceptions these compounds have been reported previously in the literature. Compounds heretofore unreported but prepared in the course of this contract are 3-oxo-1-azabicyclo (2.2.1) heptane (Compound A-17), 4-oxo-1-azabicyclo (3.2.1) octane (A-18), 2-hydroxymethylpyrrolizidine (A-25) and ethyl 2-hydroxymethylpyrrolidine-1-acetate (A-26). In addition, during the report period a second quantity of 2-keto-octahydropyrrocoline (A-19) was prepared. An effort was made to identify all compounds as fully as possible through IR spectroscopy and refractive index measurements and to ascertain the degree of purity through thin layer chromatography. (Author)

AD-439 527 Div. 4
OTS price $1.10

Texaco Experiment, Inc., Richmond, Va.
INVESTIGATION OF THE DISSOCIATION CHEMISTRY OF -NF2 COMPOUNDS.
Quarterly summary rept., Feb-Apr 64,
by J. V. Henderson, P. L. Goodfriend and H. P. Woods. 4 May 64, 7p. Rept. nos. EXP223, TM1531
Contract Nonr188300
Unclassified report

Descriptors: (*Nitrogen compounds, Free radicals), (*Fluorine compounds, Free radicals), (*Free radicals, Fluorine compounds), Dissociation, Spectra (Visibile and ultraviolet), Photolysis, Emissivity, Electric discharges, Radiofrequency, Absorption spectra, Vacuum apparatus.

The work of the past quarter continued on the search for the electronic spectrum of the NF radical. Work has proceeded in two areas: (1) A search of the vacuum ultraviolet for absorption bands of NF produced by flash photolysis of NF2. (2) A search for emission bands of NF produced by a fast discharge from a capacitor and by pulsed electrodeless radiofrequency discharges. (Author)

AD-439 607 Div. 4
OTS price $1.10

Imperial Coll. of Science and Tech., London, (England).
ADSORPTION AND SORPTION COMPLEXES.
Quarterly technical status rept. no. 2, 1 Oct-31 Dec 63,
by J. L. Whiteman. 31 Dec 63, 5p.
Contract DA91 591EUC2980
Unclassified report

Descriptors: (*Sorption, Phosphorus), (*Phosphorus, Adsorption), Minerals, Mercury, Atoms, Ion exchange, Low-pressure research, Great Britain.

AD-439 658 Div. 4
OTS price $1.10

Wisconsin Univ., Madison.
RESEARCH IN FLUORINE CHEMISTRY.
Final rept., 1 Jun 61-28 Feb 63,
by John L. Margrave. 28 Feb 63, 4p.
Grants DA AROD31 124G117, DA AROD31 124G334
AROD 1428 9 Unclassified report

Descriptors: (*Fluorine compounds, Thermodynamics), (*Chlorine compounds, Chemical reactions), (*Bromine compounds, Chemical reactions), Synthesis (Chemistry), Cesium compounds, Oxides, Nitrides, Silicon compounds, Boron compounds.

Contents: Synthesis of tetrafluorochlorates; Reactions of BrF3 with oxides and nitrides; The properties of SiF3 and BF2; and Thermodynamic properties of fluorine compounds.

Oxides, Nitrogen compounds, Carbon compounds, Water vapor, Ammonia, Fluorides, Calcium compounds, Lithium compounds, Excitation, Gas ionization, Intensity, Atomic spectroscopy, Low-pressure research, West Germany.

Some preliminary investigations of the photodissociation of simple molecules in the extreme UV (<1000 angstroms) were carried out. The gases were irradiated by dispersen light and the fluorescence intensity in the Schumann-UV - between 1100 - 1500 angstroms and 1250 - 1500 angstroms respectively - was measured as a function of the irradiating wavelength. These first experiments showed qualitatively which molecules show fluorescence within the two regions, attributable to dissociation. Gases studied included: H2, O2, NO, H2O, CO2, NH3, N2O, N2, CO. (Author)

AD-438 494 Div. 4
OTS price $1.60

Bonn Univ. (Germany).
PHOTOLYSIS OF AMMONIA IN THE FAR ULTRAVIOLET,
by H. J. Rommel. 1963, 7p.
Grant AF EOAR62 73
Unclassified report

Descriptors: (*Ammonia, Photolysis), (*Photolysis, Ammonia), Ultravilet radiation, Decomposition, Chemical reactions, Hydrazine, Photochemistry, Vacuum.

AD-438 927 Div. 4, 25, 17, 12
OTS price $2.60

AeroChem Research Labs., Inc., Princeton, N. J.
KINETIC AND AERODYNAMIC ASPECTS OF THE OXIDATION OF METALS BY PARTIALLY DISSOCIATED OXYGEN.
Semiannual progress rept., 15 Nov 63-15 May 64,
by Daniel E. Rosner and H. Donald Allendorf.
May 64, 24p. Rept. no. TN61
Contract AF49 638 1195
Unclassified report

Descriptors: (*Reaction kinetics, Oxidation), (*Refractory metals, Oxidation), (*Tungsten, Oxidation), (*Molybdenum, Oxidation), Heat of activation, Oxygen, Reentry vehicles, Low-pressure research, Probability, Surface temperatures, Atoms, High-temperature research, Excitation, Argon, Nitrogen, Helium, Filaments.

Using a resistance monitoring technique, the oxidation rate of electrically heated molybdenum and tungsten filaments has been studied over a wide range of oxygen atom concentrations and surface temperatures at flow rates such that the observed oxidation kinetics are not falsified by diffusional limitations. Partially dissociated steams are produced in the pressure range 0.7-10 Torr using a microwave discharge and O-atom concentrations are determined using the NO2 light titration technique. Under the conditions investigated the oxides of molybdenum and tungsten latilize as rapidly as they are formed and the unprotected metal is subjected to direct attack by oxygen atoms. On molybdenum and tungsten surfaces oxidation probabilities for atomic oxygen are found to be higher than corresponding values for molecular (diatomic) oxygen by up to one to two orders of magnitude, whereas the corresponding activation energies are considerably lower. Moreover, while present studies of the pressure dependence of the rates reveal complex departures from simple 'power-law kinetics' for O2 attack, the O-atom data reported follow simple first order kinetics. (Author)

AD-439 005 Div. 4
OTS price $1.10

Los Angeles State Coll., Calif.
32 MC. B'' N.M.R. SPECTRA OF R2C2B4H6 AND 1-IODO B10H13,
by Robert E. Williams and Thomas P. Onak.
30 Apr 64, 6p. Rept. no. TR5
Contracts Nonr336400, Nonr438100
Tasks NR052 427, NR356 461
Unclassified report

Descriptors: (*Decaboranes, Nuclear magnetic resonance), (*Organoboranes, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Boranes), Iodine compounds, Molecular spectrocopy.

AD-439 242 Div. 4
OTS price $5.60

Boston Univ., Mass.
SYNTHESIS OF SELECTED ETHERS, PHENOLS AND RELATED COMPOUNDS HAVING NITROGEN-CONTAINING GROUPS.
Final rept., 1 Oct 61-31 Mar 64,
by J. Philip Mason, Raymond G. McInnis, Harry L. Hennessy, Pierre D. Lord and John E. Eaton.
31 Mar 64, 53p.
Contract DA18 108CM16678
Unclassified report

Descriptors: (*Organic nitrogen compounds, Synthesis (Chemistry)), (*Phenols, Synthesis (Chemistry)), (*Ethers, Synthesis (Chemistry)), Nitrates, Alcohols, Alkanes, N-heterocyclic compounds, Amines, Pyridines, Carbamic acids, Hydroxides, Aromatic compounds, Organic sulfur compounds, Bromine compounds, Chlorine compounds, Hydrolysis, Molecular structure.

The work done under Contract No. DA-18-108-CML-6678 and the extension of this contract can best be reported in three categories. The first, Part A, is a continuation of work done on prior grants and contracts to complete the series of compounds which can be described as alpha-3-nitrophenoxy-omega-(3-nitro-5-dimenthylcarbamyloxyphenoxy)-alkanes and alpha-(3-nitrophenoxy)-omega-(3-nitro-5-hydroxyphenoxy)-alkanes. Some 1,10-bis(3-nitro-5-dimethylcarbamyloxyphenoxy)-decane was also prepared. Part B of this report contains the methods used for the preparation of various intermediates to be used in the synthesis of 1,3-bid(5-dimethylcarbamyloxy-3-pyridoxy)-propane and 1-(3-pyridoxy)-3-(5-dimethylcarbamyloxy-3-pyridoxy)-propane. Part C contains the methods of preparing various aliphatic compounds containing two tertiary amine groups and two alcohol groups, or groups which could be converted to alcohols. Much of this work was left in an incomplete state when it was decided to abandon work with the aliphatic compounds. (Author)

AD-439 243 Div. 4
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
UNCLASSIFIED ANNOTATED BIBLIOGRAPHY RELATING TO THE SYNTHESIS AND PHYSICAL PROPERTIES OF ALUMINUM HYDRIDE AND CLOSELY RELATED COMPOUNDS,
by Peter Breisacher. 21 Feb 64, 18p. Rept. no. TDR269 4210 10 4
Contract AF04 695 269
SSD TDR64 17 Unclassified report

Descriptors: (*Aluminum compounds, Hydrides), (*Hydrides, Aluminum compounds), (*Bibliographies, Aluminum compounds), Synthesis (Chemis-

systems. This method of analysis can be regarded as a generalization of the type of analysis presented in Technical Note 1 Topologic Analysis of Sectionally Uniform and Parametric Systems. We have not yet developed the concept of parity which, in the case of pairwise coupling, leads to the classification of what we called S and H coupling. However, the possibility of doing so seems to be implicit io the diagram and in the invariants developed in Interim Report 7, Sec. III. Thus, the foundation seems to have been laid for the general classification and qualitative description of all kinds of non-uniform systems. (Author)

AD-438 429 Div. 5, 8
OTS price $4.60

Mitre Corp., Bedford, Mass.
INFORMATION SYSTEMS INTEGRATION,
by R. L. Kirby. Apr 64, 44p. Rept. no. SR 93
Contract AF19 628 2390
ESD TDR63 500 Unclassified report

Descriptors: (*Automation, Communication systems), (*Military communications, Automation), Command & control systems, Data processing systems, Data transmission systems, Strategic Air Command, Military organizations, Air traffic control systems, Air Force, Combat information centers.

A series of diagrams depict the way automation has, historically, been introduced into existing organizations, emphasizing that automatic interchanges are the last to develop. The automation of air traffic control in the case of a flight path traversing adjacent control sectors is used as an example. The meaning of the total integration job is then developed in terms of levels of integration, hierarchical networks of systems, and organizational and functional interfaces by following down a systematic path through a series of diagrams through various levels to the 425L system. System specification documentation is developed with the aid of functional and physical configuration block diagrams of a typical L system as means of achieving integration. The requirement for continuous definition of interfaces, arising from the size, complexity and long lead times for modern systems, is brought out. Some implications both for and integration, in terms of top-level policy and interdependencies between systems, are discusse. The applicability of the discussion to both business systems and command and control systems is pointed out. (Author)

AD-438 430 Div. 5, 18, 30
OTS price $2.60

Mitre Corp., Bedford, Mass.
MILITARY INFORMATION SYSTEMS,
by J. F. Jacobs and E. M. Bennett. Apr 64, 22p.
Rept. no. SR92
Contract AF19 628 2390, Proj. 600
ESD TDR63 503 Unclassified report

Descriptors: (*Communication systems, Military organizations), (*Military communications, Information retrieval), Data processing systems, Military personnel, Automation, Computers.

An information system is concerned with the communication of concepts and data about the system itself and its environment. Most of its time and energy is spent in designing itself as a system, not in communicating status information or orders for action. Information-processing jobs are arranged hierarchically, and for each job level, there is a corresponding level of aggregation of the concepts and data used for information processing. High-level information is filtered through many lower levels, each of which introduces some degree of noise or bias into the system. Communication occurs both up and down the job hierarchy: messages passed downward generally include concepts and data that determine system operation; messages passed upward are usually indications of how effectively the system is developing or operating. The use of computers in information systems tends to increase specialization around the lower-level jobs, and, consequently, system communication and integration may be inhibited. Therefore, the introduction of computers into information systems must always begin at the lowest level of aggregation in the job hierarchy. Only those information-processing jobs whose rules can be standardized precisely are suitable for automation. (Author)

AD-439 359 Div. 5
OTS price $7.60

International Electric Corp., Paramus, N. J.
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L).
Monthly test progress rept. no. 31, 21 Dec 63-20 Jan 64.
20 Feb 64, 75p. Rept. no. 20130
Contract AF19 626 8
ESD TDR64 209 Unclassified report

Descriptors: (*Command and control systems, Strategic Air Command), Data transmission systems, Display systems, Data processing systems, Tests, Errors, Guided missiles (Surface-to surface), Strategic weapons, Ground support equipment.

This Monthly Test Progress Report documents the status of the Strategic Air Command Control System testing as of 2400 hours, 20 January 1964, and describes the testing and related activities which occurred during the 21 December 1963 through 20 January 1964 report period. Information is presented concerning each Milestone established in the 465L System Test Plan. The Milestone information is organized generically by Centrals and other descriptive titles for activities of similar scope. These, in turn, are consolidated according to subsystem and comparable collective designations. Testing not attributable to the 465L Syste Test Plan Milestones are reported in paragraphs associated with their related test activities. The System Test Facility (STF) located at the Contractor's Project Headquarters supported demonstrations, special tests and training. Operational information and test data obtained at the STF are used in planning and development of the 465L System. Specific activities reported included investigation of Auto Reset circuitry, Motorola printer transistor burn-outs, AXC video display problems, and DPC tape parity errors. (Author)

AD-439 437 Div. 5, 30, 15
OTS price $1.60

Coordinated Science Lab., U. of Illinois, Urbana.
PROPERTIES OF LOSSY COMMUNICATION NETS,
by W. Mayeda and M. E. Van Valkenburg. Apr 64,
19p. Rept. no. R200
Contract DA36 039AMC02208E, DA Proj. 3A99 25 004
Unclassified report

Descriptors: (*Communication systems, Networks), Communication theory, Set theory, Matrix algebra, S-matrix.

AD-439 727 Div. 4
OTS price $1.10

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF MINUTE QUANTITIES OF SELECTED ELEMENTS IN BERYLLIUM.
Interim rept. no. 1, 20 Jan-19 Mar 64.
24 Apr 64, 9p.
Contract NOw64 0081C
Unclassified report

Descriptors: (*Beryllium, Chemical analysis), Contamination, Mass spectroscopy, Gases, Atmosphere, Surfaces, Quantitative analysis.

Investigations were made to determine the components of the residual gases in the source section of the vacuum spark mass spectrograph, while at rest and during spark ionization. Studies were made of the effects on the analysis of introducing traces of gases into the sample chamber. Other sources of atmospheric-component contamination were investigated to determine their effects on the analysis for gas content. (Author)

5. COMMUNICATIONS

AD-437 936 Div. 5
OTS price $15.50

Bendix Field Engineering Corp., Owings Mills, Md.
SPECTRUM SIGNATURE OF TRANSPONDER SET AN/APX-25.
Final rept.
28 Feb 64, 234p.
Contract AF30 602 2536, Proj. 4557, Task 455701
RADC TDR63 362 Unclassified report

Descriptors: (*Transponders, Radiofrequency spectroscopy), (*Radiofrequency interference, Transponders), Radar transmitters, Radar receivers, Radar interference, Compatibility, Airborne, Identification systems, Radar beacons, Receiver-transmitters, Circuits, Tests, Sensitivity, Selection, Modulation, Photographs, Radar equipment.

Radio frequency data were collected on the transmitter and receiver of the Transponder Set AN/APX-25. There are five basic tests performed on the transmitter and thirteen on the receiver. This report is to be used as an input to the RADC Vulnerability Reduction Branch and the DOD Electromagnetic Compatibility Analysis Center (ECAC) Spectrum Signatures Library. (Author)

AD-438 031 Div. 5, 12
OTS price $7.60

Aerospace Corp., Los Angeles, Calif.
TRACKING, TELEMETRY, AND COMMAND STUDIES OF GROUND AND SATELLITE SUBSYSTEMS. VOLUME IV: AIRBORNE TRANSPONDER CONFIGURATION STUDY,
by D. Matson. Dec 63, 80p. Rept. no.
TDR269 4110 01 13, vol. 4
Contract AF04 695 269
SSD TDR63 334, vol. 4
Unclassified report

Descriptors: (*Transponders, Spaceborne), (*Space communication systems, Transponders), Telemeter systems, Radio communication systems, Space probes, L band, S band, Venus probes, Phase modulation, Data transmission systems, Digital systems, Elliptical orbit trajectories, Range finding, Doppler systems, Very high frequency, Radar tracking, Command & control systems, Air Force, Phase-locked communication systems.

System requirements which reflect upon the design of CW satellite transponders are discussed. The Mariner protoype transponder and the Goddard range and range rate transponder are taken as currently operational examples of the state of the aret. These two transponders are described in detain, and their primary advantages and disadvantages are noted. (Author)

AD-438 252 Div. 5
OTS price $5.60

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
ACTIVE NOTCH FILTER.
Apr 64, 56p.
Contract AF30 602 2904, Proj. 4540, Task 454003
RADC TDR64 104 Unclassified report

Descriptors: (*Radio receivers, Radiofrequency filters), (*Radiofrequency filters, Radio interference), Medium frequency, Phase control devices, Design, Theory, Phase shifters, Phase-locked systems.

This report describes the theory of operation and the construction of a device to reject CW interference. The device constitutes a tunable, single frequency rejection filter which uses a phase locked oscillator to obtain a narrow rejection notch in the region of 455 kc. The notch response is obtained by cancelling the signal to be rejected with a locally generated signal of equal amplitude and opposite phase. Automatic phase and amplitude control of the cancellation signal permits the rejection notch to track slow frequency and amplitude changes in the signal being rejected. A notch width of less than 100 cps is obtained with tracking being maintained over a 10 kc bandwidth centered at 455 kc. (Author)

AD-438 256 Div. 5, 15
OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
COUPLED MODE THEORY FOR ADVANCED MICROWAVE DEVICES.
Interim rept. no. 8,
by M. C. Pease and C. W. Barnes. Apr 64, 54p.
Contract AF33 657 8343, SRI Proj. 4052; ASD Proj. 4165, Task 41651
Unclassified report

Descriptors: (*Microwave equipment, Mathematical models), Algebras, Matrix algebra, Topology, Microwave networks, Microwave amplifiers, Wave transmission, Propagation, Theory, Mathematical analysis, Coupling circuits, Waveguide couplers.

The structure theorems of semisimple Lie algebras are shown to provide the coupling diagram of a system whose system matrix is a known curve in a given Lie algebra. A directed line graph is developed that exhibits the possible interactions between the modes that the system may have. The diagram is topological in that it shows the possible couplings, but not their strengths, or even whether or not they are qresent at all. However, in view of the fact that the diagram is applicable to all types of systems-multimode uniform periodic, and general non-uniform--it seems to be a tool of substantial importance in the study of general coupled mode

by E. E. Henry. Apr 64, 12p. Rept. no. 4563 61 R
Contracts AF33 616 8365; DA36 039sc78801
Unclassified report

Descriptors: (*Ultrasonic radiation, Signals), (*Light, Modulation), (*Signals, Ultrasonic radiation), Light communication systems, Optical systems, Transducers, Diffraction, Analog computers.

An ultrasonic light modulator is one good means of introducing an active signal into a beam of light for computing purposes. A light modulator has been constructed with two quartz crystals as the transducers, each with its own electronic driver. The crystals are mounted in two sides of the unit so as to produce two orthogonal ultrasonic wave trains with a common area of interaction. Water is used as the delay medium. The modulator cell is mounted in an optical system with the light beam normal to the plane of the ultrasonic axes, so that the diffraction patterns produced as the crystals are energized, both singly and simultaneously, are visible. Amplitude modulation is introduced as well as the pure resonant frequency wave. (Author)

AD-438 425 Div. 6, 30
OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MILLSTONE HILL RADAR STATION RESULTS OF LONG-BASELINE RADAR INTERFEROMETER STUDIES,
by E. Gehrels. 7 Nov 63, 53p. Rept. no. TR335
Contract AF19 628 500
ESD TDR63 566 Unclassified report

Descriptors: (*Radio interferometers, Performance (Engineering)), Radar stations, Radar transmitters, Data transmission systems, Radar antennas, Atmospheric refraction, Phase studies Data processing systems, Radiofrequency filters Radar receivers.

The Millstone-Lexington interferometer is a radar interferometer consisting of the Millstone radar transmitter, antenna, and receiver plus an auxiliary receiver station at Lexington, 13.7 nautical miles away. The final IF output of the Millstone receiver and a phase reference for the receiver's local-oscillator frequencies are transmitted to Lexington via a combination of a UHF and a microwave link. The rate of change in the phase of the signal received at Lexington with a 28-foot dish is compared with that received at Millstone to determine the angular velocity of a target. The over-all performance of the interferometer has been ascertained by a number of actual target observations. The observed phase as a function of time is compared point by point with a parabola of least-mean-square fit. The difference between these curves typically shows a random component of 15 degrees rms. (Author)

AD-438 723 Div. 6, 12
OTS price $1.60

ITT Federal Labs., San Fernando, Calif.
RESEARCH ON THE DETECTION OF INFRARED EMISSION FROM SATELLITE VEHICLES.
Final rept.,
by F. F. Hall, Jr. Feb 64, 18p.
Contract AF19 604 4971, Proj. 7670, Task 76705
AFCRL 64 302 Unclassified report

Descriptors: (*Infrared tracking, Satellites (Artificial)), Radiometers, Atmosphere, Infrared detectors, Background, Twilight, Scattering, Aerosols, Upper atmosphere, Design, Infrared radiation, Refraction.

Satellite irradiance measurements were influenced by the variable atmospheric background radiance, especially during twilight hours. Measurements of the 0.7-3.0 micron radiance of the atmosphere during twilight have been made as a function of time and zenith angle. This enables the calculation of scattering diagrams for aerosols in the upper atmosphere. Particles near the tropopause are found to scatter predominantly in the forward direction, typical of dielectric spheres. Particles near 32 kilometers are found to scatter in the backward direction, as do conductive spheres. It is shown that the data interpretation is not influenced by nonconservative scattering which may be expected due to water absorption bands in the aerosols in the near infrared. (Author)

AD-438 936 Div. 6, 12
OTS price $13.00

General Dynamics/Astronautics, San Diego, Calif.
RESEARCH DIRECTED TOWARD THE INVESTIGATION OF SUITABILITY OF THE GLOTRAC TYPE G TRANSPONDER FOR USE IN THE RANGE CALIBRATION SATELLITE.
Final rept. part B,
by R. Braun. 15 Mar 64, 182p. Rept. no. 63 1195B
Contract AF19 628 3274, Proj. 5930, Task 593003
AFCRL 64 240 pt. B Unclassified report

Descriptors: (*Transponders, Satellites (Artificial)), (*Communications satellites (Active), Range finding), Simulation, Space environmental conditions, Environmental tests, Radiofrequency interference, Tracking, C-band, Continuous wave radar, Doppler systems, Shock (Mechanics), Life expectancy, Test methods, Test equipment (Electronics).

This report covers the results of a study program directed toward determining what modifications in the GLOTRAC Type G Transponder are required to make the transponder suitable for operation in the Range Calibration Satellite (RCS). The results of an analytical study were published in part A of this report. Part B covers a test program designed to test the GLOTRAC transponder beyond the Flight Certification requirements. The report includes test results and recommendations for transponder redesign. (Author)

AD-439 405 Div. 6, 18
OTS price $7.60

General Electric Co., Syracuse, N. Y.
AIR WEAPONS CONTROL SYSTEM 412L.

AD-439 442 Div. 5
OTS price $4.60

Lockheed Missiles and Space Co., Sunnyvale, Calif.
PCM TELEMETRY: AN ANNOTATED BIBLIOGRAPHY,
comp. by Peter R. Stromer. Jan 64, 45p. Rept. no. SB64 6; 2 60 64 9
Contract NOW63 0050C

Unclassified report

Descriptors: (*Telemeter systems, Bibliographies), (*Bibliographies, Telemeter systems), Pulse modulation, Coding, Guided missiles, Spacecraft, Satellites (Artificial), Digital systems, Meteorological satellites, Multiplex, Communication satellites (Active), Communication satellites (Passive), Data processing systems, Signal-to-noise ratio, Programming (Computers), Single sideband communication systems, Data transmission systems, Analog-to-digital converters, Manned spacecraft.

6. DETECTION

AD-437 903 Div. 6, 8
OTS price $7.60

Hudson Labs., Columbia U., Dobbs Ferry, N. Y.
HYDROPHONE DEVELOPMENT AT HUDSON LABORATORIES,
by Edward T. O'Neill. 24 Sep 63, 73p. Rept. no. CU 129 63; TR108
Contract Nonr26684

Unclassified report

Descriptors: (*Hydrophones, Scientific research), Acceleration, Towed sonar, Towed bodies, Zirconium compounds, Lead compounds, Piezoelectric transducers, Titanium compounds, Pressure, Oils, Oil seals, Preamplifiers, Calibration, Vibration, Barium compounds, Measurement, Sensitivity.

This report presents the salient points of hydrophone development at Hudson Laboratories in the past five years. Described are hydrophones designed for extreme ocean depths and others designed for the effective minimization of signal due to accelerative motion as opposed to the acoustic signal. Horizontal towable arrays as well as specially designed test equipment are also described. (Author)

AD-437 905 Div. 6, 30
OTS price $3.60

Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
LATERAL ECHO SOUNDER - MODEL CL-1,
by C. S. Clay and W. Liang. 12 Mar 64, 33p.
Technical rept. 114; CU134 64
Contract Nonr266 84

Unclassified report

Descriptors: (*Echo ranging, Underwater), (*Towed sonar, Echo ranging), Electroacoustic transducers, Underwater object locators, Underwater sound signals, Towed vehicles, Ferroelectric materials, Ceramic materials, Resonators, Reflectors, Printed circuits, Radiofrequency pulses, Tests, Sonar projectors, Tuned circuits, Ranges (Distance), Circuits, Transistors, Underwater sound, Generators.

The design of a narrow beam lateral echo sounder for use on a deep-towed vehicle is given. The transducer consists of ferro-electric ceramic cylinders (2 1/4 in. x 1 1/2 in. o.d., 1 1/4 in. i.d.) operated in the first radial resonant mode, about 27 kcps. Eighteen cylinders are cemented together to form a long cylinder and placed in an oil-filled boot. The active element is placed in front of a corner reflector made of lead. The lateral beamwidth is about 3 degrees and the vertical beamwidth is 20 degrees. The remote driving electronic circuits, amplifier, etc., and the printed circuit board layouts are given. The instrument transmits a 1-msec duration pulse with a peak power of about 100 w. The results of field tests are shown and indicate that the single-sided range with this power is about 2500 ft. A maximum peak power of 500 w may be delivered with a higher voltage supply. (Author)

AD-438 035 Div. 6
OTS price $1.60

Institute of Science and Tech., Univ. of Michigan, Ann Arbor.
ORTHOGONAL ULTRASONIC SIGNALS,
by E. E. Henry. Apr 64, 13p. Rept. no. 2900 444 R
Contracts DA36 039sc78801; AF33 616 8365, Proj. 3D5801001

Unclassified report

Descriptors: (*Ultrasonic radiation, Signals), (*Light, Modulation), (*Signals, Ultrasonic radiation), Light communcation systems, Optical systems, Transducers, Diffraction, Analog computers.

An ultrasonic light modulator is one good means of introducing an active signal into a beam of light for computing purposes. A light modulator has been constructed with two quartz crystal as the transducers, each with its own electronic driver. The crystals are mounted in two sides of the unit so as to produce two orthogonal ultrasonic wave trains with a common area of interaction. Water is used as the delay medium. The modulator cell is mounted in an optical system with the light beam normal to the plane of the ultrasonic axes, so that the diffraction patterns produced as the crystals are energized, both singly and simultaneously, are visible. Amplitude modulation is introduced as well as the pure resonant frequency wave. (Author)

AD-438 036 Div. 6
OTS price $1.60

Institute of Science and Tech., Univ. of Michigan, Ann Arbor.
ORTHOGONAL ULTRASONIC SIGNALS,

AD-437 942 Div. 7
OTS price $6.60

Heliotek, Div., Textron Electronics, Inc., Sylmar, Calif.
HIGH EFFICIENCY SILICON SOLAR CELLS REPORT NUMBER VI.
Quarterly progress rept. no. 6, 15 Sep-15 Dec 63, by Paul A. Berman. 15 Jan 64, 64p.
Contract A36 039sc90777, Proj. 1G6 22001A053 03
Unclassified report

Descriptors: (*Solar cells, Manufacturing methods), Energy conversion, Design, Costs, Silicon.

Analysis of the performance of the pilot line cells fabricated during the fourth quarter indicate that the basic cell design remains highly efficient at intensities up to 2000 mW/sq cm, showing a significant improvement in the state of the art. Attempts to significantly reduce cell costs by replacing the rather lengthy junction clean-up etch by a simple edge sanding operation have shown that while some modified techniques may have value in this area, the specific technique use in the experiment resulted in too great a power loss to be of value in reducing the cost per watt ratio. Some alternate techniques are proposed. Results are presented of an experiments to determine the effect of virgin and scrap polycrystalline material on the efficiency of polycrystalline cells. The results were somewhat masked by the fact that five of the eight ingots purchased as polycrystalline material were actually partially single crystalline in nature. An appendix is included describing a radiation experiment on N+/P polycrystalline cells and the results are compared to those obtained on single crystalline cells in various light sources. The results indicate that the N/P polycrystalline and single crystalline cells degrade to the same power value at a flux of about 10 to the 14th power electrons/sq cm in a sunlight source, with the per cent degradation being considerably smaller for the former cell type. (Author)

AD-437 986 Div. 7
OTS price $3.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN) ELECTRO-INTERFERENCE DETAIL TEST REQUIREMENTS EVALUATION TEST PROGRAM FOR FIGURE A 14100, CABLE ASSEMBLY SET, POWER, ELECTRICAL FIGURE A 14101, CHARGER, BATTERY PP-4068/U FIGURE A 14102, CHARGER, BATTERY PP-4069/U FIGURE A 14103, SWITCHBOARD, POWER DISTRIBUTION SB-2686/U FIGURE A 14106, MOTOR-GENERATOR PU-605/G.
14 Apr 64, 37p. Document no. 00 1000126
Contract AF04 694 261
Unclassified report

Subcontract to Genistron, Inc., Los Angeles, Calif., and Allis-Chalmers Mfg. Co., Norwood, Ohio.

Descriptors: (*Power equipment, Tests), (*Tests, Specifications), (*Specifications, Tests), (*Ground support equipment, Power equipment), (*Radiofrequency interference, Tests), Test methods, Measuring devices (Electrical & electronic), Recording systems, Electric cables, Battery chargers, Motor-generators.

This document contains the electro-interference detailed test requirements for the evaluation test program for the LCC Power Subsystem of the Minuteman Ground Electronics System. (Author)

AD-438 519 Div. 7, 14
OTS price $12.00

Allison Div., General Motors Corp., Indianapolis, Ind.
RESEARCH AND DEVELOPMENT OF AN ADVANCED LABORATORY LIQUID METAL REGENERATIVE FUEL CELL.
Final rept.,
by J. D. Mangus. Apr 64, 170p. Rept. no. EDR3740
Contract AF33 657 11032, Proj. 8173, Task 817303
APL TDR64 41 Unclassified report

Descriptors: (*Fuel cells, Liquid metals), (*Seals (Stoppers), Fuel cells), (*Ceramic materials, Fuel cells), (*Liquid metals, Fuel cells), Potassium, Mercury, Compatibility, Mechanical properties, Electrical conductance, Porous materials, Compressive properties, Electrolytes, Rupture, Metal seals, Performance (Engineering), Thermal properties, Electrical properties, Magnesium compounds, Aluminum compounds, Thorium compounds, Electrolytes, Oxides, Potassium compounds, Chlorides, Electrolytic cells, Electric currents, Voltage, Test equipment.

A successful 68-hr seal was produced in a cell containing all components--potassium, mercury, matrix, and electrolyte. All of the ceramic materials readily available were investigated for chemical compatibility, mechanical strength, and conductivity. This led to the selection of magnesia as a suitable matrix material. Investigations were also conducted on matrix configurations to determine the most desirable configuration for mechanical strength without sacrificing electrical properties. This led to selection of a matrix with reinforcing ribs. Conductivity studies on new ceramic materials yielded encouraging results. Internal resistances approximately 1/3 to 1/2 of those currently found are predicted. A cell was designed which could be used for both the single and multiple cell tests. (Author)

AD-438 526 Div. 7, 8
OTS price $4.60

General Electric Co., Auburn, N. Y.
RESEARCH ON THIN FILM POLYCRYSTALLINE SOLAR CELLS.
Quarterly technical progress rept. no. 6, 1 Jan-31 Mar 64,
by R. W. Aldrich, J. L. Lawler, C. H. Killam, D. A. Cusano and S. J. Lubowski. 31 Mar 64, 43p.
Contract AF33 657 10601, Task 817301 33
Unclassified report

Descriptors: (*Solar cells, Films), (*Cadmium compounds, Tellurides), (*Tellurides, Solar cells), Vapor plating, Manufacturing methods, Impurities, Cadmium, Tellurium, Iodides, Semiconductors, Molybdenum, Diodes, Voltage, Electric currents, Selenides, Heat treatment, Single crystals, Metallic crystals, Solar panels, Electric connectors, Gold, Electrodes.

This report discusses research on thin film CdTe solar cells carried on during the first quarter of 1964. Changes in the design of the vapor reaction apparatus are described and evaluated. The effects of changes in the growth conditions are described. Film adherence was found to improve greatly concurrently with the use of General Electric Co. molybdenum substrates. Studies of the evaporated electrodes were continued and some work was done on plated and silk-screened electrodes. Both soldered and epoxy-bonded connections to the evaporated grid were examined, with the latter believed to be the superior technique. Studies of the effects of crystal orientation on cell characteristics

27 Mar 64, 71p. Rept. no. AWCS SQR 13
Contract AF19 628 571
Unclassified report

Descriptors: (*Aircraft intercept control systems, Reliability), Maintainability, Air control centers, Data processing systems, Command guidance, Management control systems, Scheduling, Communication systems, Life expectancy, Transistors, Semiconductor devices, Failure (Mechanics), Printed circuits.

AD-439 410 Div. 6, 30
OTS price $5.60

Santa Barbara Research Center, Goleta, Calif.
PRODUCTION ENGINEERING MEASURE PbSe INFRARED DETECTORS - TYPE IR-200.
Quarterly progress rept. no. 4, 1 Oct 63-1 Jan 64,
by G. H. Cook. 30 Apr 64, 54p. Rept. no. 5527Q4
Contract DA36 039AMC01466K
Unclassified report

Descriptors: (*Infrared detectors, Photoelectric cells (Semiconductor)), Test equipment, Specifications, Lead alloys, Selenium alloys, Laboratory equipment, Model tests, Controlled environment, Quality control, Modules (Electronics), Display systems, Wiring diagrams, Photoconductivity, Scheduling, Intermetallic compounds.

Work accomplished in this quarter is as follows: Fabrication of test equipment was completed and equipment performance was satisfactorily evaluated. The preproduction test facilities description was submitted and preproduction approval requested. Specification changes to SCS-34A were requested in coordination with USAEMA. Inspection test procedures for the new test equipment were prepared and included as part of the Quality Assurance Manual which has been submitted for approval. Fabrication of the preproduction units has commenced. (Author)

7. ELECTRICAL EQUIPMENT

AD-437 910 Div. 7
OTS price $5.60

ITT Federal Labs., Nutley, N. J.
COMMUNICATIONS CABLE FOR TROPICAL JUNGLE USE.
Interim summary rept.,
by J. H. Gesell, C. A. Emmerich and W. C. Murray.
Mar 64, 51p. Rept. no. TD 64 115
Contract DA36 039AMC02168E
Unclassified report

Descriptors: (*Electric cables, Jungles), Design, Tropical regions, Environmental tests, Conductivity, Dielectrics, Electric wire, Wear resistance, Mechanical drawings, Rodents, Electrical properties, Attenuation, Corrosion, Corrosion inhibition, Protective treatments, Plastics, Polyvinyl chloride, Polyethylene plastics.

The derivation of the design of a lightweight cable for tropical jungle use is described in terms of the environmental and tactical requirements. Information gathered from relevant literature about the jungle environment, its effect on materials and equipment, protective measures and tests to predict serviceability is presented. Materials to construct the cable are screened against the data given in the reference literature. A basic cable design is shown which is the result of a computer analysis of a range of materials and dimensions. Results of preliminary tests on prototype models made of the most feasible materials are reported. A complete test program to evaluate Phase II cable models is proposed. (Author)

AD-437 926 Div. 7
OTS price $2.60

Pratt and Whitney Aircraft, East Hartford, Conn.
LIQUID-METAL-HEATED SPACE RADIATOR-MOUNTED THERMIONIC GENERATOR.
Quarterly rept. no. 3, 1 Jan-31 Mar 64,
by F. C. Harter. 31 Mar 64, 30p. Rept. no. 2337
Contract AF33 657 11320, Proj. 8173, Task 817305 25
Unclassified report

Descriptors: (*Thermionic converters, Generators), (*Liquid metals, Heating), (*Power equipment, Thermionic converters), Tantalum alloys, Tungsten alloys, Rhenium alloys, Beryllium compounds, Oixdes, Radiators, Configuration, High-temperature research, Thermionic emission, Cesium, Voltage.

A program is being conducted for the Air Force to evaluate thermionic generators suitable for liquid metal heating in space radiator configurations. The thermionic generator incorporates a tantalum alloy liquid metal containment tube installed from a tungsten-rhenium alloy emitter by beryllia. The collector is made of nickel. During this report period the work involved the final assembly and the initial testing of the generators. At the design emitter temperature, 1500 C, the power output recorded is 5.8 w/sq. cm and the efficiency is 9.7%. The testing uncovered a form of thermal instability due to the effects of electron heating of the collector. (Author)

AD-437 931 Div. 7
OTS price $2.60

American Monarch Corp., Minneapolis, Minn.
MULTI-STATION PUSH BUTTON SWITCH.
Interim development rept., 1 Jan-31 Mar 64.
31 Mar 64, 21p.
Contract NObs89440, Proj. SR0080302, Task 9633
Unclassified report

Descriptors: (*Electric switches, Naval equipment), (*Performance (Engineering), Electric switches), Illumination, Solenoids, Shock (Mechanics), Vibration, Lenses, Seals (Stoppers).

This report covers preliminary vibration and shock testing on the three and eleven station prototypes. The vibration testing showed up a minor problem caused by the latchbar flexing. Preliminary shock testing indicates the three station switch will not unlatch under shocks in excess of a calculated 127 G's. The shock value when unlatching will occur is expected to be around 200 G's. This is not considered good enough to meet and pass the high impact shock test. Previous testing on an eleven station switch indicates similar characteristics to the three station unit. The switch as presently designed works well in all other respects and should be capable of passing a 50 G medium impact shock requirement. (Author)

Monthly rept. for period ending 30 Sep 63.
30 Sep 63, 70p. Rept. no. PR S001B
Unclassified report

Descriptors: (*Power supplies, Lunar bases), (*Electric power production, Lunar bases), Engines, Manned, Fuel systems, Nuclear power plants, Energy conversion, Fuels, Propellants, Oxidizers, Lunar surface vehicles, Storage batteries, Solar cells, Shelters.

The objectives of this study are to identify a particular engine-fuel system most compatible with the requirements and constraints of the lunar base modular concept, to define the interface effects and requirements which this system will place on the over-all effort to maintain men on the moon, and to define the development potential of this engine-fuel system by preparing concepted designs and formulating a development program. (Author)

AD-439 835 Div. 7, 20 30
OTS price $19.75

Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
ENGINEERING STUDY OF MULTIPURPOSE ENGINE AND FUEL SYSTEM FOR MANNED LUNAR BASES.

Monthly rept. for period ending 31 Oct 63.
31 Oct 63, 305p. Rept. no. PR S002B
Unclassified report

Descriptors: (*Lunar bases, Power equipment), (*Power equipment, Lunar bases), Engines and motors, Fuel systems, Moon, Energy conversion, Solar radiation, Solar cells, Fuel cells, Fuels, Oxygen, Hydrogen, Propellants, Feasibility studies, Operations research, Shelters, Space environmental conditions, Exhaust gases, Recovery, Radioactive isotopes, Nuclear power plants.

A state-of-the art review is presented on the potential fuels and regeneration processes and current performance information on energy conversion devices. Several systems have been designed for the shelter power system as a method of establishing performance and system parameters that may be utilized in the future selection of a preferred concept. The total program schedule is outlined. With few exceptions all areas are proceeding as planned, and no major roadblocks have been uncovered which would materially alter the phase of action. A mission profile is required for the various lunar roving vehicles which can be utilized to evaluate the vehicle power system concepts and their effect on fuel logistic systems. (Author)

are reported. An improved CdSe cell is described and further work on a n-on-p cell is reported. A list of representative cells fabricated during the quarter is included. (Author)

AD-439 399 Div. 7
OTS price $3.60

Lockheed Missiles and Space Co., Palo Alto, Calif.
LITHIUM-SILVER CHLORIDE SECONDARY BATTERY INVESTIGATION.
Quarterly technical progress rept. no. 1,
by J. E. Chilton Jr., W. J. Conner and R. W. Holsinger. 14 Apr 64, 38p.
Contract AF33 615 1195, Proj. 8173, Task 817304
10

Unclassified report

Descriptors: (*Batteries & components, Storage batteries), (*Storage batteries, Electrodes), (*Electrodes, Storage batteries), Silver compounds, Chlorides, Lithium, Hermetic seals, Design, Electrolytes, Polarization, Electric currents, Graphite, Additives, Silver compounds, Oxides, Alkenes, Carbonates, Electrodeposition, Aluminum compounds, Voltage, Manufacturing methods, Aerospace craft.

A secondary battery utilizing lithium and silver chloride electrodes with a nonaqueous electrolyte was shown to be feasible. The lithium-silver chloride cell has an open circuit voltage of 2.9 volts, was operated at an energy density of 25 watt hours per pound, and indicated reversible operation at up to 10% depths of discharge. Continued investigation of the lithium-silver chloride system was performed with the fabrication of a long life, high energy density secondary battery for aerospace applications as its goal. (Author)

AD-439 454 Div. 7
OTS price $4.60

Mallory Battery Co., North Tarrytown, N. Y.
TESTING AND EVALUATION OF PRIMARY ALKALINE CELLS AND BATTERIES.
Semi-annual rept. no. 6, 15 Mar-31 July 63,
by Roger Goodman. 31 July 63, 44p.
Contract DA36 039SC78320
Task 1G6 22001 A 053 02

Unclassified report

Descriptors: (*Primary cells, Tests), (*Alkaline cells, Tests), (*Batteries and components, Primary cells), Storage, Zinc, Mercury compounds, Oxides, Data.

The Cell Test Program has advanced through the sicth semi annual report period in the testing and evaluation of primary alkaline cells and batteries of the zinc-alkaline-mercuric oxide system. Initial discharge data for cell type 650R at temperatures from 20 to 200 F. and 70 F. rates of discharge from 1 to 100 hours was completed. Monthly EMF readings on nine cell types are presented in summarized form. Delayed discharge test results are presented for cell types 42R at 12 months, 502R at 18 months, 625R at 12 months, 650R at 1, 2, and 3 months, 1438R at 6 months, and 1450R at 12 months. (Author)

AD-439 652 Div. 7
OTS price $7.60

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
HIGH TEMPERATURE SOLAR THERMIONIC GENERATORS.
Quarterly technical progress rept. no. 3,
1 Nov 63-31 Jan 64.
15 Feb 64, 71p. Rept. no. ER 5802
Contract AF33 657 11169, Proj. 8173, Task 817305
24

Unclassified report

Descriptors: (*Thermionic converters, Production), Performance (Engineering), Power, Life expectancy, Failure (Mechanics), Brazing, Seals (Stoppers), Tantalum, Molybdenum, Cesium, Heat, Temperature.

A total of 2322 hours of continuous operation has been recorded for converter 302 with no apparent degradation in output power. This converter is operating at an emitter temperature of 2000K with a power output of 18.2 watts (0.7 V 26 amps). Although many life limiting features of the design were determined, it has been concluded that several failures, which occurred at the seal metal-to-ceramic brazes, resulted from having overheated the seal structures during acceptance testing. The preliminary design of a solar thermionic generator was also completed and this design dictated the shape of the Series 310 converter emitter head to conform to a four converter generator cavity wall. The generator, with emitters operating at 2000K is rated at 66 watts 4.0 volts or 108 watts at 3.0 volts. The generator assembly utilized four Series 310 converters arranged symmetrically about the solar concentrator optical axis such that the emitters form a solar cavity receiver. The configuration is such that any converter can be removed and replaced with a minimum of difficulty. The ground rules established prior to the initiation of the generator design calculation are presented herein. (Author)

AD-439 670 Div. 7
OTS price $2.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL.
Quarterly technical progress rept. no. 2, 1 Feb 63-30 Apr 64,
by J. C. Prestridge. 15 May 64, 22p.
Contract AF33 615 1185, Proj. 8173, Task 817303

Unclassified report

Descriptors: (*Fuel cells, Design), (*Hydrogen, Fuel cells), (*Oxygen, Fuel cells), Containers, Electrical equipment, Valves, Pressure regulators, Performance (Engineering), Electric power production, Temperature control, Low pressure research, Space environmental conditions, Simulation.

Performance start-up condition, and qualification testing of the Static Orbital Package was completed. Two Static Orbital Packages were delivered to RTD per schedule. A package has been installed on the launch vehicle panel and has undergone vehicle system motion tests. A vehicle systems operational test is scheduled for 18 May 1964. Work on the 28 volt system is progressing according to schedule. Preliminary design studies and testing is being conducted and two four-cell modules and associated test board were delivered to RDT. Design of the 28 volt, 400 watt laboratory prototypes is to begin 1 May 1964. (Author)

AD-439 829 Div. 7, 12, 20
OTS price $6.60

Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
ENGINEERING STUDY OF MULTIPURPOSE ENGINE AND FUEL SYSTEM FOR MANNED LUNAR BASES.

AD-437 949 Div. 8
OTS price $1.60

Westinghouse Defense Center, Baltimore, Md.
STUDY OF MICROCIRCUITRY TECHNIQUES UTILIZING MOLECULAR ENGINEERING.
Interim rept. no. 11, 20 Dec 63-20 Mar 64.
20 Mar 64, 14p.
Contract NObsr81380
Unclassified report

Descriptors: (*Miniature electronic equipment, Design), (*Pulse amplifiers, Manufacturing methods), Silicon, Diffusion, Switching circuits, Diodes (Semiconductors), Fixed resistors, Integrated circuits, Molecular electronics, Packaged circuits, Test equipment (Electronics), Test methods, Microminiaturization (Electronics).

The design and construction of sixteen pulse amplifiers which are to be packaged at a density of sixteen amplifiers per linear inch were continued. Fabrication techniques, packaging, and testing procedures are discussed. (Author)

AD-437 974 Div. 8
OTS price $9.10

Westinghouse Electric Corp., Baltimore, Md.
FUNCTIONAL ELECTRONIC BLOCKS MANUFACTURING METHODS PROGRAM. PART II BLOCK EVALUATION PROGRAM.
Interim technical progress rept. no. 6,
by A. T. Hamill and W. F. List. Dec 63, 106p.
Contract AF33 657 8913, Proj. 7 861
Unclassified report

Descriptors: (*Molecular electronics, Performance (Engineering)), Circuits, Calibration, Military requirements, Electronic equipment, Semiconductor devices, Environmental tests, Electromagnetic properties, Automatic gain control, Manufacturing methods.

This report presents the results of an extensive evaluation of functional electronic blocks produced by the Molecular Electronics Division. Much detailed data of interest to circuit designers is presented. (Author)

AD-437 981 Div. 8
OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
AN APPROXIMATE METHOD FOR COMPUTING DIFFRACTION PATTERNS CAUSED BY IONOSPHERIC IRREGULARITIES,
by Ralph Gagnon. Aug 63, 30p. Document no. D1 82 0334
Unclassified report
Also available from the author.

Descriptors: (*Ionospheric propagation, Diffraction), (*Diffraction, Ionospheric propagation), (*Ionospheric disturbances, Diffraction), Electromagnetic waves, Perturbation theory, Analysis, Integrals, Distribution, Electromagnetic fields, Equations.

A method, suitable for investigation of ionospheric phenomena, is derived for computing the amplitude and phase characteristics of an electromagnetic wave after it has been perturbed by a phase distorting screen. Kirchhoff's integral for diffraction is used to evaluate the Fresnel zone fields in terms of a field distribution which is assumed to exist over a plane surface just inside the screen. The perturbing screen is assumed to distort the front of constant phase in one dimension only. By approximating the actual curved wave front with plane wave segments, and with the use of the approximations normally used in diffraction patterns analysis, the fields are evaluated in terms of a sum involving the Fresnel sine and cosine integrals. Several examples are given. (Author)

AD-438 010 Div. 8, 13, 23
OTS price $7.60

Human Resources Research Office, George Washington Univ., Washington, D. C.
IMPLEMENTATION AND CHECKOUT OF THE FORECAST CONCEPT OF ELECTRONIC SYSTEM REPAIR AT THE U.S. ARMY ORDNANCE GUIDED MISSILE SCHOOL
by Edgar L. Shriver, C. Dennis Fink and Robert C. Trexler. Aug 63, 80p.
Unclassified report

Descriptors: (*Electronics, Maintenance), (*Maintenance, Training), Guided missiles, Operation, Checkout systems, Military personnel, Theory, Army personnel, Teaching machines, Tables.

AD-438 026 Div. 8
OTS price $2.60

Microwave Associates, Inc., Burlington, Mass.
C-AND Ku-BAND SEMICONDUCTOR TR DEVICES.
Quarterly progress rept. no. 2, 1 Oct-30 Dec 63,
by R. H. Brunton. 30 Dec 63, 29p.
Contract DA36 039AMC03187E, Proj. 1G6 22001A056
Unclassified report

Descriptors: (*Radar duplexers, Diodes (Semiconductors)), (*Diodes (Semiconductors), Radar duplexers), (*Electronic switches, Diodes (Semiconductors)), C band, K band, Waveguides, Packaging, Ceramic materials, Limiters, Coils, Attenuation, Standing wave ratios, Electric potential, Varactor diodes.

The work performed on the Ku-band investigation of ridge wave-guide with integrated diodes was concluded. Tests were discouraging because of the extremely fragile structure of the integrated varactor junction. Ku-band full and reduced height weaveguide diode mounts with coaxial shunt stubs were fabricated and evaluated. Successful results were obtained with both varactor and PIN diodes in the Pill II ceramic package. Test results showing individual, as well as, dual diode switching are presented. The results of tests to evaluate high burn-out crystal detectors is also presented. These diodes will be used to supply bias for PIN diode limiters. (Author)

AD-438 029 Div. 8
OTS price $2.25

Lear Siegler, Inc., Grand Rapids, Mich.
DEVELOPMENT OF A SOLID-STATE DISPLAY DEVICE.
Rept. for Mar 61-Feb 63,
Mar 64, 90p.
Contract AF33 616 7905, Proj. 6190, Task 619009
RTD TDR63 4163 Unclassified report

Descriptors: (*Display systems, Design), (*Electronic equipment, Display systems), Piezoelectric crystals, Electroluminescence, Barium compounds, Titanates, Polarization, Transformers, Diodes (Semiconductors), Neon, Switching circuits, Digital computers, Simulation, Photoelectric cells (Semiconductor), Photoconductivity.

The subject of this report is the development of a solid-state display device utilizing binary inputs. Investigation of various techniques for decoding the binary inputs led to the development of an electroluminescent-photoconductor matrix. Readout is provided by a column of light moving

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-437 900 Div. 8
OTS price $3.60

Radiation Lab., U. of Michigan, Ann Arbor.
THEORETICAL INVESTIGATIONS OF SCATTERING FROM PLASTIC FOAMS,
by M. A. Plonus. Sep 63, 36p. Rept. no. 5849 1T
Unclassified report

Subcontract to General Dynamics/Fort Worth, Tex.

Descriptors: (Foams, Plastics), (*Plastics, Foams), (*Scattering, Theory), (*Microwaves, Scattering), Styrene plastics, Radar signals, Density, Distribution, Refractive index, Spheres, Structural shells, Particles, Volume, Radar echo areas, Equations.

The use of cellular or foamed plastics in various microwave applications, such as supports at radar ranges makes it desirable to know the back scattering properties of such materials. Since the cell structure is of a random nature with some predictable average properties such as cell size and density, it is modeled by an aggregate of randomly distributed spherical shells. Assemblies of scatterers will in general have a coherent and an incoherent scatter. Coherent scattering comes primarily from sudden particle density changes, such as that at the boundaries of a particle system. Since coherent scattering comes only from the boundaries of a constant density material, it can sometimes be reduced by appropriate shaping. Incoherent scattering is the result of the contribution of all the particles in the system. Since the compressive strength of styrofoam is known, the maximum load that a styrofoam structure can support and the minimum achievable cross section from it can be easily calculated. (Author)

AD-437 914 Div. 8
OTS price $3.60

TRW Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE. RELIABILITY THRU PROCESS IMPROVEMENT (2N1506).
Quarterly rept. no. 6, 30 Sep-31 Dec 63,
by R. Austin, G Kamienski, P. Kellow and I. Massaron. 31 Dec 63, 31p. TRWS Rept. no. 3000 4306
Contract DA36 039sc86742
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), Silicon, Diffusion, Production, Processing, Encapsulation, Fixed contacts, Life expectancy, Tests, Surface properties, Impurities, Boron, Aluminum, Reliability (Electronics), Temperature, Power, Thermal stresses.

Efforts continued on the establishment of a PEM for the 2N1506 silicon triple diffused transistor. Evaluation of lead attachment and encapsulation techniques were completed. Linear life test results indicate a low failure rate for those improvements incorporated into the 2N1506 production process, and show a capability of providing the desired reliability level. (Author)

AD-437 937 Div. 8
OTS price $8.10

Stanford Electronics Labs., Stanford Univ., Calif.
RADAR ACCURACY AND RESOLUTION IN A MULTIPLE-SIGNAL ENVIRONMENT,
by Bill B. May. Jan 64, 88p. Rept. nos. TR2018 2, 63 151
Contract AF33 657 11144, Proj. 4036, Task 403602
AL TDR64 57 Unclassified report

Descriptors: (*Radar signals, Resolution), Noise (Radar), Time, Measurement, Radar interference, Radar receivers, Linear systems, Filters (Electromagnetic wave), Radiofrequency filters, Nonlinear systems, Errors, Attenuation.

The multiple-signal environment involves received data consisting of the sum of several signals and noise. Often the signals differ only in certain parameters such as amplitude and time of arrival. The measurement of these parameters is straightforward when the signals are separated in time; however, when the signals overlap in time, the receiving problem becomes difficult because the signals themselves act as interference in addition to the noise. Various receivers have been devised for the multiple-signal environment in this study. The goal in the derivation of these receivers is the display of the desired information in an accurate and convenient form. The optimum linear receiver, derived under an appropriate criterion, is shown to make possible a considerable improvement in data display as compared with that of the conventional matched filter. Only a small degradation in noise performance results; and the complexity, although greater than that of the matched filter, is well within reason. The optimum receivers derived in the nonlinear class are of quite complex form; this fact, along with the nonlinearity, hinders an exact analysis. However, certain calculations indicate that a significant improvement in data presentation might be possible with little or no degradation in noise performance as compared with that of the matched filter. (Author)

AD-437 946 Div. 8, 26
OTS price $4.60

Motorola, Inc., Phoenix, Ariz.
PRODUCTION ENGINEERING MEASURE. PRODUCTION DEVELOPMENT OF A SILICON PLANAR EPITAXIAL TRANSISTOR WITH A MAXIMUM OPERATING FAILURE RATE OE 0.001% PER 1000 HOURS AT A CONFIDENCE LEVEL OF 90% AT 25C.
Quarterly rept. no. 6, 1 Aug-31 Oct 63,
by Paul H. Greer. 31 Oct 63, 47p.
Contract DA36 039sc86728
Unclassified report

Descriptors: (*Semiconductor devices, Transistors, (*Transistors, Silicon), Manufacturing methods, Epitaxial growth, Acceleration, Reliability (Electronics), Distribution, Storage, Life expectancy, Failure (Mechanics), Test methods, Stability, Aluminum alloys, Gold alloys, Environmental tests, Probability.

This report contains the results of efforts expended in the Reliability Engineering area during the sixth (and final) quarter of the reliability improvement program. Final large scale tests of Al-Al-Au metallization process devices are described and the results compared with previous test results. Parameter distributions and stability during operating and storage life test are discussed as well as comparative failure rates and mechanical ruggedness. An estimate of the failure rate achieved on this program for the Motorola 2N2219 is presented. (Author)

for the magnetization. Experimental work in progress on the longitudinal pumping of a YIG disc under orthogonal detuning is discussed. (Author)

AD-438 192 Div. 8
OTS price $3.60

Radio Corp. of America, Harrison, N. J.
A 10-Mw, X-BAND TUNNEL-DIODE OSCILLATOR.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 63, by E. Diamond, E. Casterline, R. Gold and D. Nelson. 31 Dec 63, 36p.
Contract DA36 039AMC03195E, Proj. 3A99 21 002
Unclassified report

Descriptors: (*Tunnel diodes, Microwave oscillators), (*Microwave oscillators, Tunnel diodes), Manufacturing methods, X band, Superhigh frequency, Electric currents, Capacitance Resistance (Electrical), Radiofrequency power, Gallium alloys, Arsenic alloys, Chemical milling, Metal films, Tin, Impurities, Silicon compounds, Oxides, Voltage, Frequency, Waveguides.

GaAs tunnel diodes with peak currents of 50 ma, junction capacitances of 4 pF and series resistances of 1.16 ohms were tested in stripline circuits and gave 1.0 mw of rf power at 8.5 Gc. Theoretical calculations indicate that this is close to optimum performance. One hundred ma tunnel diodes were fabricated and power outputs of 2.0 mw were obtained at 6.5 Gc. The theoretical analysis presented indicates that with proper loading, it is possible to get 3.6 mw at 8.5 Gc. Optimum loading conditions for this type of diode are therefore being investigated.

AD-438 196 Div. 8
OTS price $6.60

Applied Research, Inc., Port Washington, N. Y.
RF SPECTRUM ANALYZER.
Quarterly rept., 1 Feb-30 Apr 63.
5 June 63, 70p. Rept. no. 491 01
Contract NObsr81262
Unclassified report

Descriptors: (*Radiofrequency spectroscopy, Spectrum analyzers), (*Spectrum analyzers, Design), Oscilloscopes, Test equipment (Electronics), Radiofrequency oscillators, Mechanical drawings.

AD-438 208 Div. 8
OTS price $8.60

Cooley Electronics Lab., Univ. of Michigan, Ann Arbor.
DERIVATION OF AEROSPACE ANTENNA COUPLING-FACTOR INTERFERENCE PREDICTION TECHNIQUES.
Final rept.,
by P. J. Khan, W. R. DeHart, R. M. Kalafus, A. I. Simanyi and R. B. Harris. Apr 64, 94p.
Rept. no. 4957 8F
Contract AF33 657 8178
Unclassified report

Descriptors: (*Antennas, Radiofrequency interference), (*Coupled antennas, Radiofrequency interference), (*Radiofrequency interference, Antennas), Aerospace craft, Communication systems, Mathematical prediction, Spiral antennas, Diecs, Slot antennas, Attenuation, Polarization, Antenna radiation patterns, Electric currents, Horn antennas, Antenna configurations, Electrical impedance.

This report describes the results of extensive analysis and measurement of antenna coupling factors. The purpose of these studies is to supply information essential to the adequate prediction of the interference between one electronic communication system and one or more other electronic communication systems. All antennas involved in these studies, with two exceptions, are flush mounted antennas such as would often be utilized on aerospace vehicles of either manned or unmanned types. One exception is the study of the quarter wave monopole erected perpendicularly to a common grounding surface. The second nonflush mounted antenna type studied was the dielectric rod. The report is divided into sections according to types of antennas. In some of these sections intensive analysis is given as well as experimental data. In other sections the coverage is limited to analysis. Extended coverage is given to the coupling of one Archimedean spiral to another. The Archimedean spiral is considered to be a good example of traveling wave antenna widely used for aerospace vehicles. (Author)

AD-438 222 Div. 8, 5, 12
OTS price $3.60

ACF Electronics Div., ACF Industries, Paramus, N. J.
DESIGN OF A UHF RADIOMETER FOR PLASMA MEASUREMENTS,
by Zenon Bilyk and Stephen Scrupski. 9 Mar 64, 31p. Rept. no. SR1; AR1678
Contract AF19 604 8821, Proj. 4642, Task 464201
AFCRL 64 251 Unclassified report

Descriptors: (*Radiometers, Reentry vehicles), (*Radio interference, Atmosphere entry), Ultrahigh frequency, Plasma sheath, Space communication systems, Microwaves, Gas ionization, Guided missile antennas, Sensitivity, Gain, Manned spacecraft, Telemeter systems.

AD-438 253 Div. 8
OTS price $6.60

Stanford Electronics Labs., Stanford Univ., Calif.
DESIGN FOR A HOLLOW-BEAM, DISC-LOADED, COAXIAL-LINE, TRAVELING-WAVE AMPLIFIER,
by H. A. Hogg. Dec 63, 63p. Rept. no. 63 139; TR0358 2
Contract DA36 039AMC00094E, Task 1G6 22001A055
Unclassified report

Descriptors: (*Traveling-wave tubes, Microwave amplifiers), (*Microwave amplifiers, Traveling-wave tubes), Electron beams, Coaxial cables, Electron guns, Attenuators, Disks, Suppression, Electrical impedance, Focusing, Solenoids, Impedance matching, Waveguides, Electrical properties, Voltage, Electrodes, Gain.

A detailed engineering design for a 20 percent bandwidth, 1 megawatt peak power output traveling-wave amplifier is presented. A hollow electron beam operating at 100 kv and 60 amp is used in combination with a disc-loaded coaxial line circuit. Experimental data on the electron gun, the mode-suppressing attenuator and the rf circuit are presented along with preliminary data on the over-all tube assembly and dc operation. No rf gain or power output data are available. A number of design problems were solved in detail and these solutions are presented here. (Author)

AD-438 254 Div. 8, 25
OTS price $8.60

Advanced Kinetics, Santa Ana, Calif.
HIGH POWER MERCURY SWITCH.
Final rept.
Apr 64, 93p.
Contract AF30 602 29 16, Proj. 5573, Task 557303
RADC TDR64 97 Unclassified report

up and down a vertical scale. The column of light is formed by a stack of 1/16 in. electroluminescent lamps spaced 1/32 in. apart. The display produced under this contract provides a readout from 0 to 31 volts on a scale approximately 3 in. long. (Author)

AD-438 052 Div. 8, 30
OTS price $1.60

Rome Air Development Center, Griffiss AFB, N. Y.
DIELECTRIC GASES: REDUCTION OF LEAKAGE COSTS IN HIGH POWER MICROWAVE SYSTEMS,
by Vincent C. Vannicola and Leon L. Stevens.
Mar 64, 15p.
Proj. 4506, Task 450602
RADC TDR64 67 Unclassified report

Descriptors: (*Microwave equipment, Dielectric properties), (*Gases, Microwave equipment), Gas leaks, Costs, Nitrogen, Air, Mixtures, Fluorides, Sulfur compounds, Degradation, Reduction, Flammability, Fluorocarbons, Electric insulation.

Studies and experimental investigations at Rome Air Development Center have established the technical basis for reducing the enormous costs encountered with the leakage of sulfur hexafluoride from high power microwave systems. It was found that sulfur hexafluoride could be diluted with nitrogen or air without undergoing proportionate degradations in peak power handling capability. At slightly higher gauge pressures, such diluted mixtures could be used without reducing peak power handling capability. Procedures for mixing sulfur hexafluoride and other dielectric gases with nitrogen, air, and oxygen are given if maximum efficiency and safety are to be expected. Practical application of the results can reduce leakage costs by 50 to 70%. Various examples are given. The adaptation of this technique to higher power microwave systems is recommended where leakage of sulfur hexafluoride is a significant cost consideration. (Author)

AD-438 129 Div. 8
OTS price $1.10

Watkins Johnson Co., Palo Alto, Calif.
(No title).
Monthly technical progress rept. no. 22, 1 Sep-31 Oct 63.
20 Nov 63, 8p.
Unclassified report

Subcontract to Lincoln Lab., Mass. Inst. of Tech., Lexington, Contract AF19 628 500.

Descriptors: (*Microwave amplifiers, Phased arrays), (*Phased arrays, Microwave amplifiers), L-band, Traveling wave tubes, Focusing, Magnets, Electron beams.

AD-438 133 Div. 8
OTS price $2.60

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
AUDIO PULSE CANCELLATION FILTER.
Apr 64, 24p.
Contract AF30 602 2904, Proj. 4540, Task 454003
RADC TDR64 105 Unclassified report

Descriptors: (*Radiofrequency filters, Radio receivers), (*Radio receivers, Amplitude modulation), (*Radiofrequency interference, Radio receivers), Oscillators, Phase locked systems, Pulse generators, Phase detectors, Voltage, Tuning devices, Frequency, Attenuation, Transistors.

An audio pulse cancellation filter is described. The device provides an interference suppression capability for certain cases of co-channel pulse interference in amplitude modulated communication receivers. The circuit consist of an oscillator which is phase locked to the fundamental component of an interfering pulse signal and the necessary delay and pulse generators to provide the capability for adding this locally generated pulse to the audio output signal of the receiver so as to effect a reduction in the amplitude of the interfering pulse signal. Circuit details are discussed and results of tests are presented. (Author)

AD-438 134 Div. 8
OTS price $6.60

Brunswick Corp., Marion, Va.
DEVELOPMENT OF A 1200 F RADOME.
Interim engineering rept. no. 4, 1 Jan-31 Mar 64,
by V. A. Chase and R. L. Copeland. 31 Mar 64, 68p.
Contract AF33 657 11469, Proj. 4161
Unclassified report

Descriptors: (*Radomes, High temperature research), Ceramic materials, Ceramic fibers, Aluminum compounds, Phosphates, Bonding, Thermal expansion, Reinforcing materials, Glass textiles, Aging (Materials), Mechanical properties, Physical properties, Temperature, Laminates, Superhigh frequency, Manufacturing methods, Tables, Dielectric properties.

A discussion is presented of an investigation into the effect of thermal expansion differences between the matrix and reinforcement on strength retention of glass reinforced aluminum phosphate laminates after thermal aging. New matrices were compounded and evaluated for mechanical, physical and thermal properties. Laminates were prepared from these matrices and tested at ambient temperature before and after thermal aging. The data developed indicates that the proper matching of thermal expansion for the matrix and reinforcement is necessary for maintaining high strength after thermal aging. A radome approximately 64 in. in heights was designed and fabricated from the reinforced aluminim phosphate material. A discussion of the fabrication methods developed is given. Problem areas, conclusions and recommendations are presented. (Author)

AD-438 185 Div. 8, 14
OTS price $1.60

Melabs, Palo Alto, Calif.
INVESTIGATION OF MICROWAVE NON-LINEAR EFFECTS UTILIZING FERROMAGNETIC MATERIALS.
Quarterly progress rept. no. 8, 17 Nov 63-16 Feb 64,
by Lee F. Donaghey. 16 Feb 64, 16p.
Contract DA36 039sc89206, Task IG6 22001A055 05
Unclassified report

Descriptors: (*Ferromagnetic materials, Ferrites), (*Ferrites, Electromagnetic properties), (*Parametric amplifiers, Materials), Spheres, Equations, Microwave frequency, Magnetic fields, Tuning devices, Yttrium compounds, Garnet, Disks, Oscillation, Waveguide irises, Pumping (Electronics).

The derivation of the overlap integral expressing the coupling coefficient between a pair of magnetostatic modes in a ferrite sphere is reviewed. The analysis is extended to the generalized ellipsoid with Gilbert damping terms incorporated in the general equations of motion

Descriptors: (*Networks, Reliability), Probability, Control sequences, Set theory, Matrix algebra, Switching circuits.

A Probabilistic network is defined as a linear graph with its branch weights being statistically independent discrete random variables. A general probabilistic network function is formulated in terms of the reliabilities of individual branches. Some relationship between them is also discussed. Application to probabilistic switching network is also considered. (Author)

AD-438 498 Div. 8, 30
OTS price $4.60

Northwestern Technological Inst., Evanston, Ill.
VERTEX REDUCTION NETWORK ANALYSIS,
by Howard Frank. 1 Mar 64, 44p. Rept. no. TR9
Grant AF AFOSR98 63
AROD 3298 12 Unclassified report

Descriptors: (*Networks, Topology), (*Networks, Reduction), Transformations (Mathematics), Programming (Computers), Groups (Mathematics), Set theory, Circuits, Mappii (Transformations), Matrix algebra, Control sequences, Numerical analysis, Errors.

The problem of topological network analysis is discussed, and various methods of tree generation summarized. It is concluded that no totally satisfactory method is available to generate the trees of a graph. The 'pliars entry' and generalized star mesh transformations are then introduced and a method to reduce any multi-port passive network to a three terminal representation is described. The concepts thus developed are extended to include active networks whose currents have unique solutions. Finally, the applications of the reduction techniques to digital computer solutions are considered, and several related problems are introduced. (Author)

AD-438 514 Div. 8
OTS price $3.60

Keystone Controls Corp., Newark, N. J.
5 MC SINGLE SIDEBAND CRYSTALS.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 63,
by Raymond F. Woolley. 31 Dec 63, 34p.
Contract DA36 039AMC03307E, Proj. 3A99 15 007
Unclassified report

Descriptors: (*Crystals, Single sideband communication systems), High frequency, Quartz resonators, Metal films, Evaporators, Plating, Abrasives, Cements, Measurement, Quartz, Frequency, Resistance (Electrical), Temperature, Capacitance, Electric currents, Experimental data.

The report details results of fabrication of units prepared during the quarter, and indicates problems have been encountered in maintaining desired angles of orientation through the contouring operation. 'Q' in excess of 500,000 has been achieved with units finished with a 305 abrasive and plated with an evaporated aluminum film. Successful methods of achieving a mechanically strong bond using cement are also reported. Photographs and details of the aging equipment and primary frequency standard comparison system being used in the study are presented, as well as curves of frequency and resistance vs. temperature of typical units are presented. (Author)

AD-438 521 Div. 8
OTS price $1.60

Litton Industries, San Carlos, Calif.
HIGH PERVEANCE GUN STUDY.
Quarterly progress rept. no. 10, 1 Sep-30 Nov 63,
by M. Hanley and A. Mizuhara. 4 Jan 64, 15p.
Contract DA36 039sc87313, Proj. 1G6 22001A055 04
Unclassified report

Descriptors: (*Electron guns, Klystrons), (*Microwave amplifiers, Electron guns), Performance (Engineering), Magnetic fields, Magnets, Magnetrons, Configuration, Electron tube parts.

This report on the high perveance gun study program includes the results of an investigation conducted in two primary areas. The first area involved experimental verification of the magnetic field plot which was derived from the computer studies and upon which the inverted magnetron injection gun design was based. The result of this investigation revealed a large discrepancy between the derived values and the experimental values of the magnetic field, due to an oversight in describing the boundary conditions of the magnetic field on the resistance network analogue. This discrepancy was significant enough to require an electrical redesign of the basic gun structure. The second area investigated during this report period was concerned with finding a suitable magnetic field about which a satisfactory inverted magnetron injection gun design could be made. An intensive investigation during which numerous magnetic field plots were obtained experimentally, resulted in a magnetic pole piece design which would form a suitably diverging magnetic field when used in conjunction with a solenoid. Despite the change in the electrical gun design, no changes in the klystron design objectives were made and the new gun will be designed to conform to the same electrical characteristics set forth in the previous report. (Author)

AD-438 722 Div. 8
OTS price $15.50

Institute for Cooperative Research, Univ. of Pennsylvania, Philadelphia.
INTERFERENCE STUDIES.
Final rept.,
by O. M. Salati, H. Kritikos, W. R. Lind, I. Ship and R. C. Harper. 1 July 63, 238p. Rept. no. IS63UR5
Contract AF30 602 1785, Proj. 4540, Task 45191
RADC TDR63 359 Unclassified report

In cooperation with The Moore School of Electrical Engineering, Philadelphia, Pa.

Descriptors: (*Radiofrequency interference, Scientific research), Coaxial cables, Waveguides, Electronic switches, Measurement, Test equipment (Electronics), Waveguide switches, Transmit-receive tubes, Antennas, Microwave frequency, Electromagnetic fields, Dipole antennas, Antenna radiation patterns, Horn antennas, Modulation, Demodulation, X-band, Anechoic chambers, Parabolic antennas, Impedance matching.

Section I is concerned with a theoretical and experimental study of coupling to the TE11 mode in a coaxial line in the presence of TEM signals. Bethe's small hole coupling theory is used to derive design equations. Section II is concerned with a study of techniques for measuring interpulse noise. Four techniques were explored. These were: Diode Switch, Ferrite Switch, TR Switch and a Pulse Inverter. The determination of the important parameters needed for the evaluation of

Descriptors: (*Electronic switches, Mercury), (*Switching circuits, Discharge tubes), Pulse modulation, Ionization, Plasma, Electrons, Collisions, Cathodes (Electron tubes), Conductivity, Equations.

This report describes the engineering investigation leading to the determination of the most feasible methods of utilizing the mercury pool cathode as an electron source for super high power switching device for line type modulators. A general discussion of the theoretical approach to the problem is given as well as results of experimental work. The conclusions summarize all theoretical and experimental work and make recommendations for any future work in this area. (Author)

AD-438 264 Div. 8, 20
OTS price $2.60

Boeing Co., Seattle, Wash.
THE TRANSIENT BEHAVIOR OF TRANSISTORS DUE TO IONIZING RADIATION PULSES,
by R. S. Caldwell, D. S. Gage and G. H. Hanson.
15 May 62, 27p. Document no. D2 90171
Contract AF33 616 7804
Unclassified report

Descriptors: (*Transistors, Radiation damage), (*Radiation damage, Transistors), Semiconductors, Degradation, Life expectancy, Germanium alloys, Capacitance, Electrical impedance.

The detailed mechanism of secondary photocurrent generation in transistors due to short pulse of ionizing radiation is discussed quantitatively and the results of 0.2 microsecond flash x-ray experiments are explained. The dependences of the transient current pulse on transistor types, radiation dose, initial bias level, and external circuit impedance are presented. A possible equivalent circuit controlled by stored base charges is developed which makes it possible to predict more accurately the transient responses of many transistor circuits. (Author)

AD-438 401 Div. 8
OTS price $4.60

Westinghouse Electric Corp., Elmira, N. Y.
DESIGN AND DEVELOPMENT INVESTIGATIONS OF A LOW NOISE, LINEAR, VARIABLE GAIN, R.F. AMPLIFIER TUBE.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 64,
by J. P. Pietrzyk, A. van der Jagt and R. L. Pear.
15 Apr 64, 41p.
Contract NObsr89530, Proj. SS296004, Task 7481
Unclassified report

Descriptors: (*Electron tubes, Radiofrequency amplifiers), (*Radiofrequency amplifiers, Electron tubes), Radio receivers, Gain, Design, Cathodes (Electron tubes), Measurement, Triodes, Tetrodes, Electron tube parts, Noise (Radio), Distortion, Very high frequency, Sensitivity, Automatic gain control.

The main purpose of a new design, construction D, was to reduce the noise level and to make the tube better suited for the high frequency range. For that reason we raised the transconductance to approximately 2500 umhos. At the same time we managed to achieve a very good Ib/Ic2 ratio which also will be beneficial to the noise. During the period work was also done on automatic gain control. Experiments with deflection electrodes or suppressor grids did not give the required result. Construction D of the afore mentioned designs seems to be most suited for the 200 - 400 Mc/s range. Some induction and capacitance measurements were done in order to determine the best possible stem arrangement. An approach and test outline to evaluate the tubes has been established. In the approach, the selected tubes will be substituted for the existing RF amplifier using an adaptor. Mounted in the adaptor will be those components required for the modified amplifier circuit. (Author)

AD-438 431 Div. 8
OTS price $4.60

Mitre Corp., Bedford, Mass.
METHOD FOR INCREASED DATA RATE IN TRANSMISSION OVER TIME-VARYING MULTIPLE PATHS,
by W. J. Albersheim. Apr 64, 45p. Rept. no. TM 3591
Contract AF19 628 2390, Proj. 707
ESD TDR64 79 Unclassified report

Descriptors: (*Microwaves, Propagation), Bandwidth, Troposphere, Scattering, Radar signals, Distortion, Frequency, Pulse transmitters, Radio signals, Interference, Electromagnetic waves, Antennas, Time, Modulation.

The bandwith and data rate of communication over multiple paths (such as tropospheric scatter) are limited by time spread. If the characteristics of the transmission channel vary slowly, they can be probed by a pilot signal and corrected. The proposed method transmits evenly spaced pilot pulses that are separated from the messages by isolation gaps, and corrects the path distortion by analyzing the complex frequency characteristic of the received pilot pulses. An increase in data rate of the received pilot pulses. An increase in data rate of from 10 to the 5th power to 3. 1000,000 to 3.10 million per second appears feasible under some conditions. (Author)

AD-438 488 Div. 8
OTS price $3.60

Space Sciences Lab., Univ. of California, Berkeley.
THE PROPAGATION OF ELECTROMAGNETIC WAVES IN A STATISTICALLY INHOMOGENEOUS MEDIUM I: A CRITIQUE OF THE CURRENT THEORY,
by Samuel Silver. 27 Apr 64, 38p. Rept. no. S5I29
Contract Nonr22254
Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), Scattering, Ionospheric propagation, Models (Simulation).

The theory of propagation of electromagnetic waves in a statistically inhomogeneous medium is examined for the models of the medium: (1) the discrete scatterer model, (2) the perturbed continuum model. The theory is based on the assumption that the lifetime of a configuration of the system is long compared with the period of the primary time harmonic wave. It is generally assumed also that averages of the field obtained by the ensemble method are equivalent to long time averages over the time series that the actual field constitutes. These assumptions are examined and their implications are pointed out. It is shown that there is a complete correspondence between the methodology used for the discrete scatterer model and the perturbed continuum model.

AD-438 497 Div. 8, 15
OTS price $1.60

Northwestern Technological Inst., Evanston, Ill.
ON THE PROBABILISTIC NETWORKS,
by Y. Fu. 1963, 17p.
Grant AF AFOSR98 63
AROD 3298 10 Unclassified report

7052 glass. Further studies of Mo-SiO-Mo barriers were made. Work is progressing towards realization of a compound oxide Schottky barrier using the oxides of zinc and magnesium. Studies were conducted on the metal surface films, including refractory low-work-function coatings. Vacuum emission tests using SiO barriers were made, and image tests using a phosphor screen indicate reasonably uniform emission current density. (Author)

AD-438 959 Div. 8
OTS price $9.60

HP Associates, Palo Alto, Calif.
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT.
Interim engineering rept. no. 6, 1 Dec 63-29 Feb 64.
29 Feb 64, 119p.
Contract AF33 657 9772
Unclassified report

Descriptors: (*Photoelectric cells (Semiconductor), Electroluminescence), (*Electroluminescence, Diodes (Semiconductor)), (*Diodes (Semiconductor), Electroluminescence), Gallium alloys, Arsenic alloys, Configuration, Gain, Fiber optics, Manufacturing methods, Tunneling (Electronics), Solid state physics, Effectiveness, Life expectancy, Spectroscopy, Transistors, Lasers, Modules (Electronic), Crystal structure, Production.

Significant improvements have been made both in the diffusion process and in the fabrication of ohmic contacts for GaAs el diodes. Effort was devoted to the elucidation of the physics of injection electroluminescence. It was established that a reflection effect accounts for lower energy edge peaks for both diffused and epitaxial diodes, at 300 K and 77 K, respectively. The temperature dependence of the single internal edge band is interpreted with a simple model for radiative recombination involving transitions to both holes and acceptors on the p-side. Models for each of the components of the forward current are given and compared with experiment. The dependence of quantum efficiency on current is explained, and efficiency and lifetime are found to be proportional. Photoluminescence of n-type starting material is correlated with the EL efficiencies of diffused diodes, and photoluminescence is measured as a function of depth into the diffused p-skin. (Author)

AD-438 963 Div. 8
OTS price $6.60

Electromagnetic Research Corp., College Park, Md.
RE-ENTRY PROPAGATION AND ANTENNA STUDIES.
Final rept.,
by Edward A. Wolff. 31 Mar 61, 70p. Rept. no. 61044 2
Contract AF04 647 269
Unclassified report

Descriptors: (*Antennas, Simulation), (*Antenna simulators, Measurement), (*Reentry vehicles, Propagation), (*Propagation, Reentry vehicles), Spheres, Slot antennas, Experimental data, Theory, Crystals, Plasma medium, Electrical impedance, Dielectrics, Properties.

The simulation measurements performed did not verify the type of relation derived theoretically for an insulated slotted sphere antenna. Study of the data suggests this is due to trapped waves with the dielectric medium. The measurements show the plasma seriously detunes the type of TM antenna used, even for small changes in refractive index and thicknesses which are very small electrically. An improved experimental procedure is suggested which would conform more closely to the situation postulated in the theoretical analysis, and serve as a better test of the theory. An automatic impedance matcher was designed to tune electronically a re-entry telemetry slot antenna to compensate for the detuning caused by the formation of the plasma sheath. The practicality of this matcher depends upon the availability of a ferroelectric material having low losses. An expected resonance necessary for effective performance of this material did not occur in the TM brand. This low Q precludes the use of this material in the matcher. (Author)

AD-438 964 Div. 8
OTS price $8.10

Electromagnetic Research Corp., College Park, Md.
EFFECTS OF RE-ENTRY PLASMA SHEATH ON ANTENNA CHARACTERISTICS.
Final rept.,
by M. Katzin, J. W. Marini and B. Y.-C. Koo.
30 June 60, 86p. Rept. no. 61527 3
Contract AF04 647 269
Unclassified report

Descriptors: (*Plasma medium, Antennas), (*Reentry vehicles, Antennas), (*Antennas, Plasma medium), Plasma physics, Interference, Theory, Geometry, Equations, Spheres, Reflection, Refractive index, Voltage, Distribution.

This report deals with various effects of the plasma which forms around a re-entry vehicle on antenna characteristics. A general formulation is developed for spherically inhomogeneous plasmas. It is shown that only the radial functions are affected by the inhomogeneity, so that results for the uniform plasma case can be extended to the non-uniform case by the substitution of the appropriate radial functions. The effect of noise generated by the plasma on the problem of signal reception aboard a hypersonic re-entry vehicle is discussed. The effective noise temperature of the plasma depends on the attenuation of the plasma. Thus, the optimum frequency for reception usually will be significantly lower than for transmission. An optimization procedure is described. (Author)

AD-439 004 Div. 8
OTS price $10.10

Applied Research Inc., Port Washington, N. Y.
RF SPECTRUM ANALYZER.
Final development rept. Apr 60-July 63.
July 63, 126p.
Contract NObsr81262
Unclassified report

Descriptors: (*Spectrum analyzers, Radiofrequency), Very high frequency, Ultra high frequency, Design, Sensitivity, Oscilloscopes, Viewing screens, Naval equipment, Electronic equipment.

The RF Spectrum Analyzer was developed for the visual display of amplitude and frequency of RF signals in the frequency range of 100 to 1000 MC. The frequency range is displayed in four swept bands on a 5 in. oscilloscope screen. The spectrum analyzer has sweep coverage up to 300 MC electronically with high resolution, with no spurious responses and no internally generated interference. It is useful as a search receiver, spectrum analyzer, noise interference analyzer or as monitoring equipment. (Author)

AD-439 094 Div. 8
OTS price $5.60

Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
DEVELOPMENT OF HIGH PERFORMANCE COLD CATHODE

the performance of microwave antennas is given in Section III. Section IV is concerned with methods for generating and measuring standard fields in the 1 to 10 Gc region. This research was entirely theoretical and considered only the dipole antenna. An updated collection of patterns and gain of antennas at harmonic frequencies is given in Section V. The effects of impedance missmatch and polarization are included. Section VI is concerned with the nonlinear effects of Signal Transmission. Section VII is concerned with the evaluation of antenna patterns measured in anechoic chambers. (Author)

AD-438 822 Div. 8, 20
OTS price $1.60

RAND Corp., Santa Monica, Calif.
A NOTE ON PERSISTING RADIO PROPAGATION EFFECTS AFTER HIGH-ALTITUDE NUCLEAR BURSTS,
by C. M. Crain. Mar 64, 12p. Rept. no. RM4037PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Ionospheric propagation, Nuclear explosions), (*Nuclear explosions, Radio transmission), High altitude, Airburst, Night sky, Low frequency, Very low frequency, Radiofrequency interference.

Certain high-altitude nuclear bursts produce abnormal ionization in the atmosphere which can affect radio propagation over a wide area for as long as two weeks after the burst, particularly in the LF and VLF regions. The effects are most pronounced and persistent at night. They have been reported following both the 1958 and 1962 test series, but no theoretical interpretation of them has been given so far. A general semi-quantitative theoretical explanation of the observed effects is presented, which should be of interest to those concerned with theoretical or systems applications of the large variety of effects of nuclear bursts on the lower ionosphere and on radio propagation. (Author)

AD-438 858 Div. 8
OTS price $1.60

Microwave Associates, Inc., Burlington, Mass.
SOLID-STATE MICROWAVE TR-ATR SWITCH PRODUCTION ENGINEERING MEASURES PROGRAM.
Quarterly progress rept. no. 7, 18 Oct 63-28 Feb 64,
by Paul Basken and Robert H. Brunton. 28 Feb 64, 13p.
Contract DA36 039sc86718
Unclassified report

Descriptors: (*Radar duplexers, Diodes (Semiconductor)), (*Electronic switches, Diodes (Semiconductor)), X band, Varactor diodes, Manufacturing methods, Production, Specifications, Life expectancy, Microwave equipment.

In this report, the change from the engineering phase of the program to the preproduction phase is described. With respect to the dual TR switch, the preparation of parts for manufacture of the pre-production samples is summarized. A brief account is given on the progress in the development of the single TR switch. This device is shown to be developed from techniques established during the design of the dual TR switch. (Author)

AD-438 867 Div. 8
OTS price $2.60

SFD Labs., Inc., Union, N. J.
PRODUCTION ENGINEERING MEASURE FOR A Ka-BAND INVERTED COAXIAL MAGNETRON.
Quarterly progress rept. no. 3, 7 Nov 63-6 Feb 64,
by P. du Fosse and M. Liscio. 7 Nov 64, 24p.
Rept. no. 29QPR3
Contract DA36 039AMC01472E
Unclassified report

Descriptors: (*Magnetrons, K band), Life expectancy, Electron tube heaters, Anodes (Electron tubes), Power, Modulators, Environmental tests, Spectrum analyzer.

During this report period, six model tubes of the refined mechanical design were built and evaluated. Electrical evaluation data of the six tubes are presented. Oscillation life tests and cycled heater life tests are reported. Results of the anode evaluation program and the areas of further improvement are discussed. Power output capabilities of greater than 100 kw are reported as are the power output versus frequency characteristics of a late model tube. (Author)

AD-438 879 Div. 8
OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE WEST FORD ANTENNA SYSTEM,
by B. F. LaPage. 6 Dec 63, 47p. TR338
Contract AF19 628 500
ESD TDR63 591 Unclassified report

Descriptors: (*Communication systems, Scattering), (*Antennas, Communication systems), Superhigh frequency, Design, Noise (Radio), Antenna feeds, Polarization, Attenuation, Transducers, Signals, Telemetering antennas, Distribution, Antenna radiation patterns.

The West Ford orbital scatter communications system consits of two installations. One site is located on the West Coast of the United States, at Camp Parks, Pleasanton, California, and the other site is located on the East Coast, at Westford, Massachusetts. Each site employs a 60-foot diameter Cassegrainian antenna system operating near 8 Gcps. This presentation will cover the requirements, design, and performance of two related low-noise feed systems for the West Ford antennas. One feed provides an on-axis beam only, the second feed produces tracking beams and a simultaneously operated low-noise communications beam. The design and performance of some auxiliary components such as a polarizer, diplexer, and radome are also discussed. (Author)

AD-438 938 Div. 8
OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
THIN-FILM COLD CATHODES FOR MICROWAVE TUBES.
Interim rept. no. 1,
by D. V. Geppert and B. V. Dore. May 64, 41p.
Contract AF33 615 1345, Proj. 4812
Unclassified report

Descriptors: (*Cold cathode tubes, Tunneling (Electronics)), (*Tunneling (Electronics), Cathodes (Electron tubes), (*Cathodes (Electron tubes), Tunneling (Electronics)), Glass, Sapphires, Gold, Electrodes, Silicon, Molybdenum, Monoxides, Silicon compounds, Zinc compounds, Metal films, Semiconducting films, Sandwich construction, Work functions, Electric currents, Manufacturing methods, Surface properties, Oxides.

Several types of cathode substrates were investigated, including glass microscope slides, sapphire rods with Hanovia gold electrodes, molybdenum rods with M-24 glaze, and Kovar rods and sleeves with

Descriptors: (*Radomes, Plastics), (*Airframes, Radomes), Guided missiles, Radar antennas, Tests, Filament wound construction, Machine tools, Lathes, Manufacturing methods, Mandrels, Epoxy plastics, Glass textiles.

Efforts concern a program to develop a suitable fabrication procedure and to subsequently fabricate two missile airframes 10 inches in diameter by 30 in. long by .140 in. thick. Two filament-wound missile airframes were fabricated using a ratio of longitudinal to loop windings of 2 to 1. The only filament winding machine at Picatinny is a lathe-type machine that cannot produce longitudinal windings. Therefore a system was devised whereby hoop windings were wound on a large 10-inch-diameter drum and subsequently cut into developed segments to produce longitudinal fibers. It may be concluded from test results obtained to date that filament-wound airframes with the required dimensions can be fabricated on the lathe-type filament winding machine. The airframe was tested for ability to withstand design loads. Test results are presented. (Author)

AD-439 230 Div. 8, 26
OTS price $4.60

TRW Semiconductors, Inc., Lawndale, Calif.
TRANSISTOR, VHF, SILICON, POWER (10W-500MC).
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by J. Crishal and R. Neville, ed. by B. Rappaport.
31 Dec 63, 44p. Rept. no. 59RD2
Contract DA36 039AMC03189E
Unclassified report

Descriptors: (*Semiconductor devices, Transistors, (*Transistors, Silicon), Impurities, Diffusion, Processing, Manufacturing methods, Metal coatings, Gold, Silver, Vapor plating, Phosphorus compounds, Oxychlorides, Esters, Borates, Silicates, Evaporation, Photoengraving, Very high frequency, Pyrolysis, Design, Electrical properties.

A phosphorus oxychloride source is used for n type impurity diffusions, and an n-propyl borate, etch solution has been worked out for P type impurity diffusions. Gold and silver are being evaluated for over-the-oxide metallizing by evaporation. Difficulties in etching the metal between base and emitter stripes have been encountered due to the narrow spacing. A modified disc power package will be used in the fabrication of this device. Initial tests at 250 megacycles indicate good performance. (Author)

AD-439 236 Div. 8
OTS price $2.60

Microwave Associates, Inc., Burlington, Mass.
BROADBAND MICROWAVE POWER LIMITERS.
Quarterly rept. no. 3, 1 Jan-31 Mar 64,
by R. Tenenholtz. 31 Mar 64, 25p.
Contract NObsr89462, Proj. SR0080302, Task 9637
Unclassified report

Descriptors: (*Limiters, Broadband), Circuits, Diodes (Smeiconductor), Inductance, Electrical impedance, Coaxial cables, Variactor diodes, X band, S band, L band, Solid state physics, Capacitance, Radiofrequency, Crystal rectifiers.

Theoretical aspects dealing with scaling low power prototype limiter designs to higher power versions are covered. In addition, experimental results covering various portions of anticipated final design configurations are also included. This deals with such items as bias crystals and insultated diode mounts. In addition, 1-kw operation performance on an L/S-band unit is also described. (Author)

AD-439 237 Div. 8, 30
OTS price $4.60

Radio Corp. of America, Camden, N. J.
LOW COST ARMY MICROMODULE PROGRAM.
Quarterly rept. no. 1, 1 July-30 Sep 63,
by P. Margolin. 30 Sep 63, 43p.
Contract DA36 039AMC03259E, DA Proj. 3A99 15 005
Unclassified report

Descriptors: (*Modules (Electronics), Microminiaturization (Electronics)), Packaged circuits, Costs, Reliability, Performance (Engineering), Timing devices, Packaging, Miniature electronic equipment, Thin films (Storage devices), Silicon, Research program administration, Operations research, Design, Timing circuits, Transmitter receivers, Linear systems, Digital systems, Semiconductor devices, Computer logic, Model tests, Soldering, Linear systems, Feasibility studies, Gates (Circuits), Transmitter receivers, Printed circuits, Computers.

This program is directed toward establishing design criteria for low-cost linear and digital modular assemblies by combining the best features of the micromodule packaging technique with microelectronic techniques and devices employing solid silicon, thin films and hybrid circuits. The MICRORAC computer was studied and an appropriate functional assembly (the Timing Level Generator) was selected to serve as the demonstration vehicle for the low-cost micromodule. The monolithic silicon device was chosen as the best approach for achieving low-cost modules. A survey of digital devices manufactured by nine semiconductor companies revealed that Motorola (MECL) and Fairchild (Micrologic II) have off-the-shelf devices which can meet the performance requiremtns of the MICRORAC computer. A module structure was selected which would have 28 internal riser wires of which 20 emerge from the bottom face. Two possibilities for the leads, one a 12-terminal frame and the other a 14-terminal lead frame, were under evaluation. A 28-notch interconnection wafer was proposed as a preliminary design. (Author)

AD-439 238 Div. 8, 30
OTS price $3.60

Radio Corp. of America, Camden, N. J.
LOW COST ARMY MICROMODULE PROGRAM.
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by P. Margolin. 31 Dec 63, 40p.
Contract DA36 039AMC03259E, Proj. 3A99 15 005
Unclassified report

Descriptors: (*Modules (Electronics), Microminiaturization (Electronics)), (*Tuning devices, Modules (Electronics)), Packaged circuits, Costs, Reliability, Performance (Engineering), Timing devices, Packaging, Miniature electronic equipment, Thin films (Storage devices), Silicon, Research program administration, Operations, Design, Timing circuits, Linear systems, Digital systems, Semiconductor devices, Computer logic, Model tests, Soldering, Linear systems, Feasibility studies, Gates (Circuits), Transmitter receivers, Printed circuits, Computers.

The selected functional assembly of the MICRORAC computer, the Timing Level Generator, was analyzed; and four module types were developed to satisfy its requirements. The modules contain either 2, 3, or 4 Integrated Circuit Packages and one interconnection wafer. A new Integrated Circuit Package having 14 leads was developed as a compatible unit for assembly into the new module. Each terminal of the package connects with an alternate riser wire of the module. De-

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

FLASH X-RAY TUBES,
by Earl C. Cooper and Frank J. Grundhauser.
20 Sep 63, 59p.
Contract NOw62 0604c
Unclassified report

Subcontract to Field Emission Corp., McMinnville, Ore.

Descriptors: (*X-ray tubes, Cold cathode tubes), (*Cold cathode tubes, X-ray tubes), Production, Manufacturing methods, Reliability (Electronics), Seals (Stoppers), Cathodes (Electron tubes), Configuration, Magnetic fields, Coils, Electric discharges.

The work covered by this report was directed toward the development of a low-cost, high-performance, expendable, single-shot X-ray tube. The objectives for the tube development were: (a) a tube type that could economically be used as a single-shot device, (b) a tube that could be usable either on the three-channel pulse transformer system or with the modified Femcor surge pulser, and (c) a tube that would meet the high performance and reliability specifications that are applicable to the multiple-pulse thermal-field (TF) emission and vacuum arc types. (Author)

AD-439 203 Div. 8
OTS price $4.60

Texas Instruments Inc., Dallas.
SOLID-STATE COOLING OF FUNCTIONAL ELECTRONIC BLOCKS.
7 May 64, 42p. Rept. no. 20 74300 20
Contract AF33 657 8588, Proj. 4159, Task 415905
AL TDR64 71 Unclassified report

Report on Molecular Electronics.

Descriptors: (*Cooling, Thermoelectricity), (*Modules (Electronic), Cooling), (*Cooling, Modules (Electronic)), Semiconducting films, Solid state physics, Tellurium alloys, Bismuth alloys, Vapor plating, Thickness, Thermal stresses, Soldering, Epoxy plastics, Semiconductor devices, Electrical networks, High temperature research, Gallium alloys, Arsenic alloys, Manufacturing methods, Temperature control, Glass, Photoengraving, Chemical milling.

Techniques for fabrication of thermoelectric coolers in sizes comparable to solid-state network circuit blocks were investigated. Two laboratory methods for deposition of films of bismuth telluride by vacuum evaporation were devised. These are multiple boat evaporation of tellurium and bismuth at controlled rates and flash evaporation of a mixture of the materials from a hot filament. Films up to 0.0003 inch thick were made. The principal problem encountered was differential thermal contraction between film and substrate during cooling. Glass substrates were used in the experiments. An improved substrate material is needed. Prototype thermoelectric coolers were fabricated by two methods: photoetching of raw material sheets to provide individual elements and manual assembly of individual elements in an epoxy matrix. The latter method was the more successful. A satisfactory technique for assembly of coolers by soldering tabs to the matrices was developed. A module 1 inch square by 0.16 inch thick was constructed and tested. Capacity was approximately 10 watts at 45 C delta T. (Author)

AD-439 218 Div. 8
OTS price $0.50

Naval Research Lab., Washington, D. C.
A 550-MEGAWATT PULSE MODULATOR,
by J. P. Kitchen, D. C. DePackh, H. R. D. Roess and T. J. O'Connell. 10 Apr 64, 11p.
Proj. RR002 01 41 4904
NRL 6073 Unclassified report

Descriptors: (*Modulators, Electron guns), (*Electron guns, Pulse modulators), Electrical impedance, Power supplies, Time, Capacitors, Hermetic seals, Discharge tubes, Transformers, Inductance, Impedance matching, Power, Pulse generators.

This development of a 1000-ampere electron gun made a modulator necessary to supply pulse power to the gun. The stringent requirements imposed on the pulse characteristics by the gun preclude a run-of-the-mill type of modulator. These requirements are: peak voltage in excess of 500 kv, flat top less than one microsecond in length with a flatness of 1% for at least 150 ns, and a rise and fall time less than one microsecond. A modulator was developed and tested which meets or exceeds these requirements. An 0.5 microfarad capacitor and an 0.3 microfarad capacitor, each built up of silvered Mylar sheets, are contained in a hermetically sealed tank and form part of a two-section network. The housing of a triggered spark gap acts as a low-impedance transmission line to connect across to another hermetically sealed tank containing a transformer having on it a flange for attachment of the gun. The transformer has a single-turn primary and a 31-turn secondary. The leakage inductance of the transformer and its leads, which has to be small, is 0.12 microhenries. To match properly with this, the inductance of the 0.5 microfarad plus its connection to the 0.3 microfarad capacitor is held below .06 microhenries. The pulse repetition rate is one per second. (Author)

AD-439 223 Div. 8
OTS price $2.60

Harry Diamond Labs., Washington, D. C.
TRANSISTOR FLIP-FLOP AND RING COUNTER WITH NON-VOLATILE MEMORY,
by Ira R. Marcus. 5 Feb 64, 21p.
HDL Proj. 46300; DA1P523801A300
HDL TR1198 Unclassified report

Descriptors: (*Relaxation oscillators, Transistors), (*Transistors, Scalers), (*Scalers, Transistors), Pulse counters, Magnetic cores, Circuits, Computer logic.

A modification of the standard transistor flip-flop and ring counter circuits was made that allows setting information to be inserted by an electrical pulse. The supply voltage is not applied to the stages during the insertion of the setting information. When the supply voltage is interrupted and reapplied, the stages will return to the state they were in before the interruption. These features are incorporated into the flip-flop and ring counter circuits with the addition of one square-loop magnetic core per stage. (Author)

AD-439 224 Div. 8, 12
OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
FABRICATION OF A LIGHTWEIGHT PLASTIC MISSILE RADOME,
by Harvey Peritt and Merrill Eig. Apr 64, 24p.
FRL TM1156 Unclassified report

section which follows summarizes and presents a comprehensive introduction and guide to the antenna designer or application engineer on this subject. (Author)

AD-439 425 Div. 8
OTS price $5.60

Illinois U., Urvana. Engineering Experiment Station.
MEASUREMENT OF THE PHASE CENTERS OF ANTENNAS,
by John D. Dyson and Robert E. Griswold. Dec 63, 54p. TR66
Contract AF33 657 10474, Proj. 6278, Task 6278 01
Unclassified report

Descriptors: (*Log-periodic antennas, Phase (Electronics)), Antenna radiation patterns, Detectors, Phase studies, Recording equipment, Dipole antennas, Conical antennas, Spiral antennas.

There are many antennas, including the log-periodic and log-spiral antennas, that do not have a unique phase center. For these antennas an ''apparent phase center'' is defined over a limited range of space surrounding the antenna. A measurement technique has been developed that will permit automatic plotting of modified phase patterns from which the effective position of this ''apparent phase center'' may be determined. This technique requires the use of only standard antenna pattern recording equipment and a detector which is sensitive to the amplitude and to the phase of the radiated field of the particular antenna under consideration. Deviations of these patterns from a unit circle on a polar plot or straight line on a rectangular plot (or as a modification, from the amplitude pattern) may be interpreted from curves supplied, to show the position of the phase center with respect to the known center of rotation used to obtain the patterns. Using only slightly more complex equipment, a variation in the system will permit the phase center to be determined directly at any angle of observation around the antenna. This modified system may be servo-controlled to provide an automatic plot of relative position of the apparent phase center. The system can materially reduce the time required to determine the phase center of antennas and should be a useful tool in the study of those antennas for which a phase center does not exist. (Author)

AD-439 440 Div. 8, 7
OTS price $3.60

Lockheed Missiles and Space Co., Sunnyvale, Calif.
THE DESIGN AND ANALYSIS OF ELECTRICAL ELECTRONIC SYSTEMS BY MEANS OF DIGITAL COMPUTERS: AN ANNOTATED BIBLIOGRAPHY,
comp. by Charlie M. Pierce. Sep 63, 34p. Rept. no. 2 60 63 2; SB63 65
Contract NOw63 0050C
Unclassified report

Descriptors: (*Electrical networks, Simulation), (*Electronics, Simulation), (*Bibliographies, Electronics), (*Circuits, Design), Networks, Digital computers, Electrical equipment, Electronic equipment, Digital systems, Analog systems, Analog computers, Power equipment.

Computerized methods of designing and analyzing electrical and electronics systems are being used with increasing frequency because of the demand for more complex and more efficient systems. This publication consists of 63 references dealing with the application of digital computers in this field. Most of the references were published between January 1958 and June 1963. The references are alphabetically arranged according to the first author. Indexes are included for corporate author, personal author, and subject. (Author)

AD-439 484 Div. 8, 15
OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SCATTERING MATRIX OF A MODIFIED (FIVE-PORT) TURNSTILE,
by J. A. Kostriza. 24 Apr 64, 18p. Group rept. 1964 20
Contract AF19 628 500
ESD TDR64 51 Unclassified report

Descriptors: (*Microwave networks, Matrix algebra).

The scattering matrix of a five-port junction (modified turnstile, where the two orthogonal TE11 modes in circular guide are replaced by a single TEM or coaxial mode) is obtained, using the symmetry properties of the junction. (Author)

AD-439 485 Div. 8
OTS price $3.60

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
Quarterly progress rept. no. 6, 14 Aug-14 Nov 63,
by W. J. Noroski, Jr., 14 Nov 63, 36p.
Contract DA36 039SC86731
Unclassified report

Descriptors: (*Cathode ray tubes, Manufacturing methods), Deflection, Design, Vapor plating, Aluminum, Metal coatings, Vacuum, Industrial equipment, Vacuum apparatus, Electrodes, Production.

This is the Sixth Quarterly Report describing the progress of the USAEMA contract, Production Engineering Measure for the Manufacture of Deflectron Devices. The major portion of this work period was devoted to the preparation of engineering samples and further refinement of the evaporation technique. Evaporation equipment has been completed and put into operation. All parts necessary for the completion of the program are either on hand or ordered to be supplied by approved vendors as required. Test and performance characteristics for the three models of the Deflectron are being finalized. (Author)

AD-439 486 Div. 8
OTS price $1.60

Cornell-Dubilier, Electronics Div., Federal Pacific Electric Co., Norwood, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE PRODUCTION OF SILICON MONOXIDE CAPACITORS MICROELEMENT.
Quarterly rept. no. 3, 30 Nov 63-29 Feb 64,
by J. J. O'Connor. 29 Feb 64, 14p.
Contract DA36 039AMC01478E
Unclassified report

Descriptors: (*Capacitors, Manufacturing methods), (*Silicon compounds, Capacitors), Production, Monoxides, Industrial equipment, Glass, Microminiaturization (Electronics), Aluminum compounds, Oxides, Jigs, Vapor plating.

The microcircuit jig and deposition monitor were received and installed. A great deal of refitting and adjusting was required before this equipment could be satisfactorily operated. Capacitors were made on glass substrates and

sign rules are established for allocating pin functions in the 28/30 module, for allocating terminal leads of the integrated circuit packages and for employing intramodule interconnection wafers. Results indicate that for an employing intramodule interconnection wafers. Results indicate that the 28/20 module assembly will satisfy the low-cost objective of this program, because standard logic-element monolithic devices are available in suitable flat packages; and instant compatibility of the integrated circuit package and module is obtained by substituting a special lead frame in the vendor's standard product. Each module employs only one of two standardized interconnection wafers. The logic content of the 28/20 module assembly has a density of at least 5 times greater than the standard 12-lead micromodule. (Author)

AD-439 240 Div. 8
OTS price $5.60

Chatham Electronics Div. Tung-Sol Electric Inc., Livingston, N. J.
ELECTRON TUBES RADIATION RESISTANT PILOT LINE PRODUCTION.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 63, by F. B. Parks and John F. Grimm. 31 Dec 63, 59p.
Contract DA36 039AMC01476E
Unclassified report

Descriptors: (*Electron tubes, Radiation damage), (*Radiation damage, Electron tubes), Manufacturing methods, Production, Glass seals, Molding, Processing, Vacuum apparatus, Life expectancy, Temperature, Test equipment (Electronics), Aging (Materials), Gain, Voltage, Thermal stresses, Heating, Electron tube parts, Industrial equipment.

Efforts were continued on a program to establish a pilot line production capability for producing nuclear radiation-resistant electron tube types 6080WB, 6360, 5886 and 6205. Improvements were made to the stem-making and glass-sealing equipment, as well as to the stem-forming molds. The techniques and processes pertaining to both these operations were modified in line with the indicated direction of higher yield and lower shrinkage. Work has proceeded with the design and construction of equipment essential to Phase II such as: the high temperature, dual vacuum exhaust station; the 500 C. life test kit; power preheaters, static characteristics sets, aging racks, and a voltage gain test set; and modification to the pinch press type sealing machine for the 5886 tube. (Author)

AD-439 241 Div. 8
OTS price $2.60

Chatham Electronics Div., Tung-Sol Electric, Inc., Livingston, N. J.
PRODUCTION ENGINEERING MEASURE FOR TYPE 7890 SUPER POWER HYDROGEN THYRATRON.
Quarterly progress rept. no. 7, 8 Sep-7 Dec 63, by C. L. Shackelford. 7 Dec 63, 23p.
Contract DA36 039sc85984
Unclassified report

Descriptors: (*Thyratrons, Hydrogen), Tests, Life expectancy, Electron tube parts, Titanium, Aging (Materials), Cathodes (Electron tubes), Production, Manufacturing methods, Radiofrequency power.

Work to produce a satisfactory tube using the 13 slot grid structure was continued. Tubes #5 and #6, started during the previous period, were processed. Tube #6A was lost during brazing operations. Tube #7 was assembled, processed, tested and operated sucessfully for 560 hours at Operation (1) life test conditions. Another tube, #8, also having the 13 slot grid had its envelop assembled at the end of the period. (Author)

AD-439 263 Div. 8
OTS price $8.10

Sylvania Electric Products Inc., Waltham, Mass.
RADAR INTERFERENCE STUDY,
by Walter B. Mills and J. F. Clark. Apr 64, 85p.
Contract AF19 604 8484
ESD TDR64 240 Unclassified report

Descriptors: (*Radar interference, Theory), Search radar, Circuits, Frequency shift, Moving target indicators, Plan position indicators, Radar echo areas, Air traffic control systems, Doppler radar, Meteorological parameters, L band, Ground controlled approach radar, Experimental data, Photographs.

The electrical signatures of a particular type of radar interference called angels were studied in detail during a three-year program using the radar facilities at Fort Dawes, Boston Harbor. The types studied were single angel, group angel, and misscellaneous. Based on the electrical signatures obtained during the early part of the program, circuits were developed and implemented to eliminate the single and group types from the FPS-8 (L-Band) MTI radar outputs. Cancellation experiments as well as the circuits used are discussed in detail. A physical model is presented to account for the single angel returns. Among other properties, the model accounts for the angel beamwidth relative to normal targets and the doppler shifted angel spectrum unaccompanied by any visible translation. The credibility of the theoretical model describing single angels is based on the experimental results. Experiments which could provide a more definitive confirmation of the theory are suggested. (Author)

AD-439 280 Div. 8
OTS price $19.75

General Electric Co., Pittsfield, Mass.
STUDY OF ANTENNA AXIS CONFIGURATIONS FOR SATELLITE TRACKING AND CONTINUED STUDY OF TRANSPORTABLE ANTENNA SYSTEMS.
Quarterly rept. no. 2, 1 Oct-31 Dec 63, by M. Howe, R. Garcia, W. Neubert, C. Wales and W. Quick. 29 Apr 64, 316p.
Contract DA36 039AMC03333E, Proj. 62230PM63 916127
Unclassified report

Descriptors: (*Antennas, Guided missile tracking systems), Antenna components, Motion, Tracking, Supports, Parabolic antennas, Servomechanisms, Azimuth, Elevating gear, Mathematical models, Equations, Servo amplifiers, Mobile.

The Analytical Study of Antenna Axis Configurations considered the Azimuth-Elevation (AZ-EL), X-Y, Differential, Equatorial and 3-Axis mounts (The Ball-joint Mount will be covered in the Final Report). Equations are developed, curves plotted, and illustrations presented to allow comparison of the areas of the study. A summary of the antenna survey and analytical study is presented for use by systems and project engineers. The Reliability and Availability section provides the necessary fundamentals and application information for the prediction or determination of tracking antenna reliability. The Environmental Conditions and Requirements

AN ABNORMALLY IONIZED ATMOSPHERE,
by C. M. Crain and H. G. Booker. Mar 64, 13p.
Rept. no. RM4031PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Ionospheric propagation, Attenuation), Radio transmission, Low frequency, Very low frequency, Ions, Radio signals, Absorption, Atmosphere, Reflection.

AD-439 629 Div. 8, 12
OTS price $19.75

Physical Science Lab., New Mexico State Univ., University Park.
FLUSH AND NONFLUSH MOUNTED TELEMETRY ANTENNAS FLUSH MOUNTED COMMAND CONTROL ANTENNAS S-BAND AND C-BAND BEACON TRANSPONDER ANTENNAS ANTENNA SYSTEMS FOR SPECIFIC MISSILES, PROBES AND SATELLITES.
Final rept., 1 Jan 60-31 Mar 63,
by Henry D. Weinschel and H. W. Haas. 15 Oct 63, 335p.
Contract AF19 604 6198
Unclassified report

Descriptors: (*Rocket antennas, Scientific research), (*Scientific research, Rocket antennas), (*Antennas, Space probes), Telemetering antennas, Sounding rockets, Instrumentation, Command and control systems, S band, C band, Beacons, Transponders, Satellite antennas, Guided missile antennas, Ultrahigh frequency, Mechanical drawings, Electrical properties, Electrical impedance, Frequency, Voltage, Standing wave ratios, Antenna radiation patterns, Tables, Weight, Loop antennas, Very high frequency.

Research concerned development of antenna designs for research rockets and associated ground instrumentation systems and installation in research rockets including Aerobee, Cajun Spaerobee, Exos, Asp, Astrobee and such other rockets as directed. Short descriptions of antenna systems which were not part of this contract, but are of interest, are included. The contents are arranged by subject matter rather than chronological order. A photograph and/or assembly drawing is provided for each antenna discussed. The electrical characteristics of the various antenna types are presented by impedance versus frequency curves, by VSWR versus frequency curves, by patterns of the principle plane cuts and by power contour plots. (Author)

AD-439 640 Div. 8, 25
OTS price $1.10

Israel Inst. of Tech. (Haifa).
RESEARCH ON ELECTROMAGNETIC NOISE AT EXTREMELY LOW FREQUENCIES.
Summary rept. no. 1, Aug 61-May 63,
by N. Robinson and U. Galil. May 63, 8p.
Contract AF61 052 555
AFCRL 64 352 Unclassified report

Descriptors: (*Noise, Extremely low frequency), (*Electromagnetic waves, Ionospheric propagation), Measurement, Audiofrequency, Whistlers, Theory, Analysis, Data.

Data of electromagnetic noise at 5 Kcps have been continuously recorded since August 1962. From these data an analysis of research on electromagnetic noise at extremely low frequencies has been made and results have been published in various journals. (Author)

AD-439 645 Div. 8
OTS price $1.60

Electromagnetic Technology Corp., Palo Alto, Calif.
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND, AND X-BAND.
Interim development rept. no. 10, 1-30 Apr 64. 15 May 64, 15p.
Contract NObsr89536, Proj. SF0100201, Task 9294
Unclassified report

Descriptors: (*Frequency converters, Production), L-band, S-band, C-band, X-band, Diodes (Semiconductor), High pass filters, Klystrons, Modulators, Crystal oscillators, Standing wave ratios, Attenuation.

The match of the L-band version of the 3 db hybird four-crystal converter using cutoff 1N53B crystals was significantly improved to values very close to specification. The double-balanced modulator based on the TE11 mode in coaxial line was constructed. Preliminary tests were begun using four curoff 1N53B diodes. Up conversion with a loss of 12 db was achieved in spiet of some difficulties in matching the input and output ports. Work was continued on the distributed crystal holder approach, with four cutoff 1N53 crystals. A more sophisticated holder was made that enabled L. O. power (RF bias) to be applied to the crystals. The results look promising and work is continuing. Improved rectangular high pass filters were designed and are being manufactured. Several versions of frequency converters were readied and sent to the Naval Research Laboratory for examination and display. Three developmental klystrons were delivered for the L.O. frequencies of 28.5, 31.0, and 31.5 Gc. (Author)

AD-439 649 Div. 8
OTS price $15.00

New Mexico Univ., Albuquerque Engineering Experiment Station.
ELECTRIC FIELDS FROM AIRBORNE VERTICAL AND HORIZONTAL DIPOLES AT VERY-LOW FREQUENCIES.
by A. H. Garry Gibson. Apr 64, 230p. Rept. no. EE 105
Contract Nonr2798 01FBM
Unclassified report

Descriptors: (*Electric fields, Very low frequency), (*Very low frequency, Electric fields), Antenna radiation patterns, Ionosphere, Reflection, Diffraction, Earth, Gain, Polarization, Experimental data, Equations.

AD-439 672 Div. 8
OTS price $1.60

Harshaw Chemical Co., Cleveland, Ohio.
RESEARCH ON PHOTOVOLTAIC CELLS.
Quarterly progress rept. no. 7, 1 Nov 63-31 Jan 64,
by Donald J. Harvey and Norman E. Heyerdahl.
Feb 64, 15p.
Contract AF33 657 7916, Proj. 7885, Task 7885 02
Unclassified report

Report on Research in Solid State Physics.

Descriptors: (*Solar cells, Scientific research), Semiconducting films, Cadmium alloys, Tellurium alloys, Vapor plating, Vacuum apparatus, Molybdenum, Zinc, Aluminum, Gallium, Indium, Impurities, Heat treatment, Resistance (Electrical), Electrical properties.

The work was initiated to study the fabrication and principal features of thin film solar cells based on materials other than CdS. In previous

glazed alumina substrates that have reasonable capacitance and dissipation factors as measured at room temperature. However, the alumina micromodule-substrate capacitor has capacitance and dissipation that are very high. (Author)

AD-439 494 Div. 8, 26
OTS price $1.60

General Electric Co., Owensboro, Ky.
7486 CERAMIC TRIODE PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 6,
by J. D. Marshall. 31 Dec 63, 20p.
Contract DA36 039SC86738
Unclassified report

Descriptors: (*Triodes, Production), Life expectancy, Test equipment (Electronics), Vacuum pumps, Tests, Diffusion pumps, Ceramic materials, Electron tube parts, Ultra high frequency, Super high frequency, Electron tube heaters, Tables, Tests.

The preproduction phase has been completed. Life tests have been completed in which effects of ion pump vacuum exhaust equipment are compared with oil diffusion exhaust. Preparation of the Quality Control and Inspection Manual is in process. (Author)

AD-439 503 Div. 8
OTS price $5.60

Georgia Inst. of Tech., Atlanta, Engineering Experiment Station.
ELECTRONIC EQUIPMENT INTERFERENCE CHARACTERISTICS-COMMUNICATION TYPE.
Quarterly rept. no. 4, 15 Nov 63-15 Feb 64,
by O. H. Ogburn, E. E. Donaldson, Jr., P. T. Spence and C. W. Stuckey. 15 Feb 64, 52p.
Rept. no. 25
Contract DA36 039AMC02294E, Proj. 3B24 01 001
Unclassified report

Descriptors: (*Radio receivers, Microwave equipment), (*Microwave equipment, Microwave spectroscopy), (*Microwave spectroscopy, Radio receivers), Test methods, Mathematical models, Mixers, Harmonics, Fourier analysis, Diodes (Semiconductor), Triodes, Test methods, Test equipment.

Suggested testing techniques derived from standard spectrum signature tests conducted on U. S. Army microwave communications receivers are outlined. The importance of the receiver preselector in the reciever evaluation studies is emphasized. Common pitfalls encountered in the testing proceudures are discussed and alternate test methods are presented. A finite mathematical model of a mixer characteristic is developed through the use of the Fourier series. Calculated harmonic levels based on the mathematical model were found to approximate the corresponding measured levels from a simple diode nonlinearities are considered. Mixer theory is discussed for a vacuum tube triode mixer. Data taken on a 6J4 triode mixer are compared to responses computed by a previously developed prediction technique applicable for diode mixers. This comparison indicates that the prediction technique is valid for vacum tube mixers of the type tested. (Author)

AD-439 520 Div. 8
OTS price $10.10

Zenith Radio Corp., Chicago, Ill.
DEVELOPMENT OF A HIGH FREQUENCY ELECTRON-BEAM PARAMETRIC AMPLIFIER.
Final rept., 1 July 61-31 Jan 64,
by Peter G. Everett, Roy A. Larsen and Charles G. Nelson. 31 Jan 64, 123p. Rept. no. 10
Contract DA36 039SC88915, Task IG6 22001A055 04
Unclassified report

Descriptors: (*Parametric amplifiers, Electron beams), (*Microwave amplifiers, Design), L band, Cyclotron waves, Pumping (Electronics), Magnetic fields, Cathodes (Electron tubes), Helixes, Molybdenum, Traveling wave tubes.

Work on a non-degenerate electron beam parametric amplifier is described. Because of sources of electron beam noise unsuspected at the beginning of the project, the original aim of a high-frequency non-degenerate amplifier was modified to the development of a DC-pumped amplifier with a high cathode magnetic field operating at L-band. A summary of a feasibility study of traveling-wave tubes operating with the slow cyclotron mode is included. (Author)

AD-439 528 Div. 8
OTS price $6.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
RESEARCH STUDIES ON PROBLEMS RELATED TO ANTENNAS.
Quarterly progress rept. no. 5, 1 Sep-30 Nov 63, Mar 64, 63p.
Contract AF33 657 10474, Proj. 6278, Task 6278 01
Unclassified report

Descriptors: (*Antennas, Scientific research), Helical antennas, Log periodic antennas, Slot antennas, Spiral antennas, Design, Electromagnetic fields, Antenna radiation patterns, Direction finding, Airborne, Varactor diodes, Preamplifiers, Waveguides, Lens antennas.

AD-439 585 Div. 8
OTS price $1.60

Bomac Div., Varian Associates, Beverly, Mass.
BL-221 70 Gc MAGNETRON PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 10, 6 Nov 63-6 Feb 64,
by Robert C. Sibley. 6 Feb 64, 17p.
Contract DA36 039SC85974
Unclassified report

Descriptors: (*Magnetrons, Extremely high frequency), Production, Manufacturing methods, Tests, Life expectancy, Environmental tests, Tables.

Eleven tubes were built using the final design anode processing and cathode anode dimensions. Tubes numbered 69, 72, 73, 74, and 76 were made available for preproduction testing. Tube number 73 completed the 600 cycle life test requirement satisfactorily. Tubes numbered 69, 72, and 74 plus a spare tube number 76 were tested satisfactorily for all specification requirements except life, shelf storage, and mechanical dimensions. A new hob, B-6, was made. Tube number 78 was completed to test the frequency of this new hob. The frequency was high. (Author)

AD-439 615 Div. 8
OTS price $1.60

RAND Corp., Santa Monica, Calif.
THE EFFECT OF IONS ON LF AND VLF PROPAGATION IN

run being 6.0 minutes. A maxium total pressure of 55 atm was reached with a throat heat flux estimated to be in the range of 3000 to 3500 Btu square feet-sec. (Author)

AD-438 000 Div. 9
OTS price $8.10

Gas Turbine Lab., Mass. Inst. of Tech., Cambridge.
THE BEHAVIOR OF TURBULENT BOUNDARY LAYERS IN ADVERSE PRESSURE GRADIENTS,
by Hal L. Moses. Jan 64, 87p. Rept. no. 73
Contract Nonr1841 91, Proj. S R009 01 01
Unclassified report

Descriptors: (*Turbulent boundary layer, Mathematical prediction), Reviews, Reynolds number, Shear stresses, Separation, Pressure, Bibliographies, Gas turbine blades, Incompressible flow, Theory, Integral equations, Vortices, Three-dimensional flow, Viscosity, Mathematical analysis.

The problem of predicting the behavior of the incompressible turbulent boundary layer in an adverse pressure gradient is re-examined. An outline of the problem is given along with a brief summary of the work that has already been done, including both experimental investigation are presented for a separating turbulent boundary layer with various pressure distributions. An approximate theory is developed in which the momentum integral equation is satisfied for each half of the boundary layer. The velocity profiles used in the analysis consist of the well known wall and wake regions, resulting in a two-parameter family with the Reynolds number as one parameter. It is assumed, with some experimental justification, that the eddy viscosity can be reasonably approximated from zero pressure gradient experiments. The numerical calculations, using the Runge-Kutta procedure, show good agreement with the experiments. The reliability that can be expected of such approximate methods is discussed. (Author)

AD-438 171 Div. 9
OTS price $8.10

Aerospace Corp., Los Angeles, Calif.
AERODYNAMIC INFLUENCE COEFFICIENTS FROM INCOMPRESSIBLE STRIP THEORY: ANALYTICAL DEVELOPMENT AND COMPUTATIONAL PROCEDURE,
by William P. Rodden, Edith F. Farkas, Heather A. Malcom and Adam M. Kliszewski. 3 Sep 62, 83p. Rept. no. TDR169 3230 11TN5
Contract AF04 695 169
SSD TDR62 89 Unclassified report

Descriptors: (*Aerodynamic characteristics, Data processing systems), (*Airfoils, Subsonic characteristics), Two-dimensional flow, Incompressible flow, Theory, Oscillation, Programming (Computers), Punched cards, Deflection, Rotation.

A method is presented for computing the aerodynamic influence coefficients (AICs) for a surface in motion in a subsonic flow. The method is based on the most fundamental solution in unsteady flow theory--that of Theodorsen for the oscillating two-dimensional airfoil in an incompressible flow. Definitions are given which relate the aerodynamic forces to the surface deflections. The AICs are derived from strip theory considering the airfoil to have the three degrees of freedom: pitching, plunging, and control surface rotation. The Aerospace IBM 7090 Computer Program No. HM07 provides the AICs in printed and optional punched-card output formats. The program capacity is 25 surface strips and 50 values of reduced velocity. (Author)

AD-438 261 Div. 9, 12
OTS price $3.60

Boeing Airplane Co., Seattle, Wash.
THE INVISCID FLOW OF REACTING AND RADIANT AIR PAST A HYPERSONIC BLUNT BODY,
by Haim Kennet. 15 Oct 60, 40p. Document no. D2 9055
Unclassified report

Descriptors: (*Blunt bodies, Hypersonic characteristics), Viscosity, Thermodynamics, Absorption, Geometry, Shock wave, Air, Velocity, Thermal radiation, Atmosphere entry, Reflection, Emissivity, Supersonic characteristics, Chemical reactions, Conical bodies.

The inviscid hypersonic flow around an arbitrary blunt body of revolution has been formulated for machine computation. The highly accurate streamtube continuity method was extended to cover the case of chemically reacting and thermally radiating optically thin air, when the flow is in complete thermodynamic and chemical equilibrium. An extension to the case of opaque air is also given for the special case of a spherical nose of unit surface emissivity. The present schem calculates the flow field well into the pure supersonic region at which point currently existing techniques, such as the method of characteristics, can be applied. (Author)

AD-438 262 Div. 9, 25
OTS price $3.60

National Aeronautics and Space Administration, Washington, D. C.
VOID FRACTION MEASUREMENTS IN CAVITATING MERCURY,
by Frederick G. Hammitt, Willy Smith, Ian E. B. Lauchlan, Richard D. Ivany and M. John Robinson. Feb 64, 35p. Internal rept. no. 22
Grant NsG39 60, ORA Proj. 03424
Unclassified report

Descriptors: (*Fluid flow, Cavitation), (*Cavitation, Fluid dynamic properties), (*Mercury, Fluid dynamic properties), Gamma rays, Cobalt, Optical instruments, Density, Optical phenomena, Measurement.

A method is described for obtaining precise measurements of local density (or void fraction) in an axially-symmetric two-phase flow or of men density in a plane parallel to (or through) the centerline. The application of the method to cavitating mercury in a venturi test section is described. The basic flow measurements resulting are presented. (Author)

AD-438 263 Div. 9
OTS price $5.60

Boeing Co., Seattle, Wash.
TWO DIMENSIONAL OR AXIALLY SYMMETRIC REAL GAS FLOWS BY THE METHOD OF CHARACTERISTICS, PART IV. NONEQUILIBRIUM FLOW RESEARCH,
by Donald W. Eastman. 18 Sep 62, 53p. Document no. D2 20874
Unclassified report

Descriptors: (*Axially symmetric flow, Mathematical models), (*Non-equilibrium flow, Atmosphere entry), Two-dimensional flow, Air, Programming (Computers), Equations, Shock waves, Thermodynamics, Mathematical analysis.

The method of characteristics equations for two-dimensional or axisymmetric non-equilibrium real gas flow is formulated for machine computation. The basic equations were derived assuming rotational, inviscid flow of a reacting multi-compo-

quarters CdS:Se, CdSe, ZnSe and GaSAs have been examined. Some effort has also been directed to the preparation of suitable films of CdTe by vacuum coevaporation. During this quarter the work involved the following aspects of the CdTe thin film solar cell. The high contact resistance observed between evaporated CdTe and molybdenum was circumvented by the inclusion of evaporated layers of Zn, Al, Ga, In or In2Te3 between the CdTe and the molybdenum. A program was devised to examine the essential features of the chemistry of CdTe photovoltaic barrier formation in aqueous solution. Special apparatus was designed and constructed for this purpose. In addition various GaAs evaporated films were annealed at temperatures up to 550 C to ascertain the effect of doping and annealing upon polycrystalline GaAs films. (Author)

AD-439 694 Div. 8, 26
OTS price $7.60

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS.
Quarterly progress rept. no. 6, 31 July-31 Oct 63.
by Jeremiah A. LoConte. 31 Oct 63, 75p.
Contract DA36 039SC86724
Unclassified report

Descriptors: (*Transistors, Germanium), (*Manufacturing methods, Transistors), Production, Chemical milling, Machining, Electric currents, Electrolytic polishing, Surface properties, Oxides, Tests, Thermal stresses, Acceleration, Ultrasonic radiation, Life expectancy.

AD-439 808 Div. 8
OTS price $11.00

Technical Research Group, Menlo Park, Calif.
DEVELOPMENT AND TESTING OF HF WIRE-GRID LENS ANTENNA. VOLUME I.
Final rept.,
by R. L. Tanner, E. M. T. Jones, M. G. Andreasen and E. D. Sharp. Mar 64, 147p. Rept. no. RD64 33
Contract ARDS598, Proj. 113 23 1D, TRG-West Proj. W102
Unclassified report

Descriptors: (*Lens antennas, High frequency), Focusing, Electromagnetic waves, Electric wire, Antenna radiation patterns, Refraction, Antenna feeds, Impedance matching, Tests, Direction finding, Design.

An HF lens antenna, the first of its kind, has been built at the FAA International Flight Service Receiver Station at Molokai, Hawaii. The lens employs a novel focusing medium consisting of two wire grids, one above the other, whose wave slowing or refractive characteristics are to first order independent of frequency. This property makes the lens inherently capable of operation over very wide bandwidths. The basis refractive profile and circularly symmetric form of the lens are similar to the well known Luneburg lens. As a consequence, the HF Wire-Grid Lens is in focus for wave arriving from any azimuthal direction. By locating output couplers at many different points on the periphery of the lens, it becomes the equivalent of many highly directive, broadband antennas pointed in the many different directions. For many applications, therefore, a single Wire-Grid Lens is able to replace a large number of more conventional rhombic antennas. Pattern measurements have been made on the completed full-scale antenna using a ground-based transmitter. (Author)

AD-439 830 Div. 8
OTS price $3.60

Datametrics Corp., North Hollywood, Calif.
STUDY OF UNPOWERED PERSONNEL TRANSMITTER TECHNIQUES.
Research contract status rept. no. 3, 1 Feb-1 Mar 64,
2 Mar 64, 37p.
Contract AF33 615 1130, Task 433506
Unclassified report

Descriptors: (*Radio transmitters, Portable), Radiofrequency oscillators, Bandwidth, Crystal oscillators, Transistors, Electrical properties, Operation, Attenuation, Limiters, Transistor amplifiers.

AD-439 833 Div. 8
OTS price $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SHOCK TUBE TEST OF A HORN ANTENNA,
by George A. Coulter. Oct 63, 42p.
RDT and E Proj. 1M010501A006
BRL TN1515 Unclassified report

Descriptors: (*Horn antennas, Shock (Mechanics)), (*Shock (Mechanics), Horn antennas), Pressure, Piezoelectric tranducers, Models (Simulations), Shock tubes, Loading (Mechanics), Tests, Instrumentation.

The results from air shock loading a model of an inverted horn reflector type antenna are given for incident nominal shock overpressures of 50, 100, and 160 psi. The data are presented in the form of pressure-time traces obtained from piezo-electric transducers flush-mounted at several points on the interior wall of the model. (Author)

9. FLUID MECHANICS

AD-437 973 Div. 9, 30
OTS price $7.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SOME CONSIDERATIONS IN THE DESIGN OF WATER-COOLED NOZZLE THROAT SECTIONS FOR HIGH TEMPERATURE, HIGH PRESSURE OPERATION,
by Henry F. Lewis and Dennis D. Horn. Apr 64, 73p.
Contract AF40 600 1000, ARO Proj. PL2289
AEDC TDR64 51 Unclassified report

Descriptors: (*Wind tunnel nozzles, Electric arcs), Design, Liquid cooled, Water, Heat exchangers, Nozzle inserts, Heat transfer, High pressure research, High temperature research, Hypersonic wind tunnels, Nozzle inserts.

The calibration of a Linde N-4000 electric arc heater necessitated having a nozzle (restrictor) capable of repeated operation at high pressures and temperatures. The theoretical and experimental bases used in the design of the water-cooled nozzle are presented. Included are the procedures to determine the nozzle linear material, liner thickness, water flow requirements, and optimum wall operating temperatures. Two nozzle liners designed for 100 atm total pressure and 5000 Btu square feet-sec throat heat flux were operated without failure for a total of about 80 minutes, the longest sustained

tics, Wind tunnel models, Model tests, Boundary layer, Deflection, Shock waves, Interference, Stresses, Theory, Motion, Damping, Two-dimensional flow.

A series of panel flutter experiments were performed in the GALCIT transonic wind tunnel. The preflutter panel motion and the motion during flutter were studied in detail. Flutter boundaries were obtained between Mach numbers 1.15 and 1.5. Three analytical studies of the flutter phenomenon, based upon conventional assumptions, are presented which facilitate comparison between theory and experiment. A detailed comparison between the theoretical and experimental results reveals considerable disagreement in the flutter boundaries at supersonic Mach numbers less than 1.4. The agreement between theory and experiment improves at the higher Mach numbers. The theory appears inadequate for the prediction of flutter boundaries at the lower supersonic Mach numbers. A possible cause of this inadequacy of the theory is discussed. (Author)

AD-438 832 Div. 9
OTS price $5.60

Polytechnic Inst. of Brooklyn, N. Y.
SIMILAR SOLUTIONS FOR THE HYPERSONIC LAMINAR BOUNDARY LAYER NEAR A PLANE OF SYMMETRY,
by Massimo Trella and Paul A. Libby. Feb 63, 57p. Rept. no. PIBAL825
Grant AF AFOSR62 409
AFOSR 64 0566 Unclassified report

Descriptors: (*Laminar boundary layer, Hypersonic flow), Bodies of revolution, Air foils, Hypersonic characteristics, Three dimensional flow, Viscosity, Pressure, Equations, Mathematical analysis, Two-dimensional flow, Fraction, Heat transfer.

The laminar hypersonic boundary layer near a plane of symmetry is treated from the similarity point of view. Cases of favorable and adverse pressure gradients in the plane of symmetry and of inflow to and outflow from that plane are considered. The similarity parameters are related to physical observables so that the results may applied, at least in terms of local similarity, to determine the boundary layer characteristics in practical problems. It is found that crossflow has significant effects on the boundary layer in the plane of symmetry when the pressure gradient is adverse. (Author)

AD-438 890 Div. 9
OTS price $8.10

Ordnance Research Lab., Pennsylvania State Univ., University Park.
AN INVESTIGATION OF THE FORCES ON AN AIRFOIL OSCILLATING IN PITCH ABOUT THE QUARTER CHORD,
by F. E. Smith and M. Sevik. 12 Mar 64, 81p.
Contract NOw63D209C
Unclassified report

Descriptors: (*Airfoils, Oscillation), (*Aeroelasticity, Airfoils), Theory, Vortices, Incompressible flow, Lift, Pitch (Motion), Wake, Mathematical models, Test methods, Water tunnels, Flow visualization.

The lift and moment on an airfoil oscillating in pitch about the quarter chord line in an incompressible non-cavitating flow was determined. Theoretical values were obtained by using Theodorsen's analysis. The contributions of the various terms in the theory were investigated to explain the deviation between theory and test results. At high values of the reduced frequency parameter, defined as the ratio between a characteristic body length and a wave length of the hydrodynamic disturbances, it is shown that existing theories are unreliable. This fact is supported by the results of this investigation. Some of the basic assumptions underlying existing theories are examined, such as the satisfaction of the Kutta-Joukowski trailing edge condition. Some photographs of the vortex formation in the wake of an oscillating airfoil are presented. The model, dynamic balance system, and oscillating system designed and used for this investigation are discussed in detail. (Author)

AD-438 926 Div. 9, 1, 30
OTS price $9.60

Melpar Inc., Falls Church, Va.
SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT. VOLUME II. V/STOL ANALYSIS REPORT,
by Walter McIntyre. Sep 63, 116p.
Contract N61339 1205
NTDC 1205 2 Unclassified report

Report on Study, Equations of Motion of Vertical/Short Take-Off and Landing Operational Flight/Weapon System Trainers.

Descriptors: (*Short take-off planes, Simulation), (*Vertical take-off planes, Mathematical models), Equations, Motion, Training devices, Tilt wings, Stability, Convertible planes, Hovering, Research planes, Flight simulators.

An analysis made of V/STOL for simulation purposes, and equations of motion compatible to either analogue or real time digital solution are developed. A general set of equations of motion are developed in which axis systems and aerodynamic coefficients are minimized. Equations of motion are then developed for five different V/STOL aircraft wherein the need for additional axis systems and aerodynamic coefficients for a particular V/STOL configuration is developed. (Author)

AD-439 008 Div. 9
OTS price $3.60

Brown Engineering Co., Huntsville, Ala.
A METHOD OF DETERMINING FLOW FIELDS OF BLUNT-NOSED SLENDER BODIES AT ARBITRARY ANGLES OF YAW,
by V. L. Reed. Jan 64, 38p. Rept. no. TN R85
Contract DA01 021AMC85Z
Unclassified report

Descriptors: (*Slender bodies, Gas flow), (*Blunt bodies, Gas flow), Yaw, Explosions, Shock waves, Compressible flow, Thermodynamics, Energy, Drag, Pressure, Viscosity, Hemispherical shells, Cylindrical bodies, Conical bodies.

Blunted slender bodies at angles of yaw are studied using the similarity solution, i.e., blast wave theory, with modifications to predict experimental data to a high degree of accuracy. The yawed body is examined and the shock surface located on a hemisphere-cylinder combination. Further methods are proposed for evaluation of prolated spheroid-cylinder and blunted cone configurations. (Author)

AD-439 219 Div. 9, 12, 6
OTS price $2.60

General Electric Co., Philadelphia, Pa.
TURBULENT BASE FLOW BEHIND A SLENDER SUPERSONIC RE-ENTRY VEHICLE,
by Joseph Brown. 7 May 64, 26p. Document no. 63SD849
Contract AF04 694 222
Unclassified report

nent gas. An approximate model of dissociated non-equilibrium air is presented which is ideal for use with the method of characteristics. Results from a simple one-dimensional program which uses this model of air compare very closely with results from a program which uses a much more sophisticated model. (Author)

AD-438 421 Div. 9
OTS price $3.60

David Taylor Model Basin, Washington, D. C.
A FORTRAN PROGRAM FOR THE CALCULATION OF THE EQUILIBRIUM CONFIGURATION OF A FLEXIBLE CABLE IN A UNIFORM STREAM,
by Elizabeth H. Cuthill. Mar 64, 36p.
DTMB 1806 Unclassified report

Descriptors: (*Cables (Mechanical), Fluid mechanics), (*Fluid dynamic properties, Drag), Programming languages, Vector analysis, Errors, Correction, Stresses, Tensile properties.

A FORTRAN II program is described that is used on the IBM 7090 system at the David Taylor Model Basin to calculate the equilibrium configuration of a flexible cable in a uniform stream in the plane determined by the direction of motion of the stream and by the direction of the force of gravity. (Author)

AD-438 450 Div. 9, 25
OTS price $2.60

Seiler Research Lab., Air Force Academy, Colo.
SITTING TIME AND STRAIN EFFECTS IN A .00005 INCH DIAMETER COLD WIRE FOR LOW DENSITY SHOCK TUBE USE.
Final rept. Nov 63-Apr 64,
by Charles F. Stebbins. 7 Apr 64, 23p.
Proj. 7905
SRL 64 1 Unclassified report

Descriptors: (*Wire, Strain (Mechanics)), (*Heat transfer, Measurement), Shock waves, Shock tubes, Vibration, Analysis, Hypersonic flow, Subsonic flow, Shock resistance, Drag, Simulation, Instrumentation, Tensile properties, Wind tunnels, Physical properties, Molecular properties.

The very fine, cold wire (diameter < .00005 in.), a comparatively new instrument for use in fast-transient, free-molecule-flow problems, has been used to measure heat transfer rates within a plane shock wave up to shock Mach numbers of 7.5. However, discrepancies exist between theoretical predictions and experimental results. In an effort to resolve these discrepancies, several characteristics of the very fine, cold wire are investigated. These include strain-induced-resistance changes and molecular sitting time. Sitting time, the finite time increment involved in the transfer of thermal energy between a surface and an impinging molecule, is shown to be three orders of magnitude smaller than shock-passage time, thus causing no appreciable error in the results. The elimination of concern with these two effects under certain conditions brings the cold-wire closer to the status of an acceptable instrument for fast-transient, free-molecule-flow applications. (Author)

AD-438 477 Div. 9
OTS price $7.60

Aerospace Corp., El Segundo, Calif.
WALL ROUGHNESS EFFECTS ON INVISCID NONEQUILIBRIUM FLOW IN DUCTS,
by C. Ortloff. 16 Mar 64, 76p. Rept. no. TDR269 4230 20 6
Contract AF04 695 269
SSD TDR64 28 Unclassified report

Descriptors: (*Ducts, Gas flow), Nonequilibrium flow, Friction, Surface properties, Viscosity, Equations, Frozen equilibrium flow, Pressure, Three-dimensional flow, Subsonic flow, Supersonic flow.

The mean-square pressure fluctuation at the walls of a duct containing inviscid nonequilibrium flow is derived for cases of exponential and delta function autocovariance function wall roughnesses for subsonic and supersonic Mach numbers. Solutions for two- and three-dimensional sinusoidal walls are also included. For the limiting cases of frozen and equilibrium flows, the random roughness wall solutions for the first-order potential are given in terms of source and sink-like singularities, the strengths of which are proportional to the local wall slope, and may be taken as randomly distributed along the wall. The mean-square fluctuation quantities are shown to be related to the autocovariance function of the first derivative of the wall roughness function. The dependence on the mean-square pressure fluctuation of certain statistical properties of the roughened wall is shown to be factorable from the pressure fluctuation expression; this leads to an easily determined estimate of the influence of certain properties of the roughness on the pressure fluctuation. Numerical examples are given to indicate the application of the method. (Author)

AD-438 655 Div. 9, 30
OTS price $2.60

General Electric Co., Schenectady, N. Y.
DAMPING IN SLIGHTLY NON-LINEAR SYSTEMS: IMPLICATIONS TO DYNAMIC STABILITY TESTING,
by J. M. Abel. 1964, 27p. Rept. no. ATDM1 20
Contract AF33 657 11411, Proj. 8219, Task 821902
Unclassified report

Descriptors: (*Wind tunnel models, Test methods), Stability, Angle of attack, Oscillation, Damping, Motion, Mathematical models, Mathematical analysis, Measurement, Nonlinear systems.

The method of Krylov-Bogoliubov is used to analyze the response of a one degree of freedom second order system with various forms of nonlinear damping. The amplitudes of the responses are computed for oscillations about differing equilibrium positions and the resulting amplitude decays are compared. The results of the analysis are discussed with regard to their implications to dynamic stability testing in an attempt to resolve the question of testing at high or low mean incidence and to point out the importance of considering non-linearities in the reduction of dynamic stability test data. Examples of the application of the results to actual test data are given. (Author)

AD-438 785 Div. 9
OTS price $8.10

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
COMPARATIVE EXPERIMENTAL AND THEORETICAL STUDIES OF THE FLUTTER OF FLAT PANELS IN A LOW SUPERSONIC FLOW,
Final rept.,
by M. H. Lock and Y. C. Fung. May 61, 89p.
Rept. no. 95
Contract AF49 638 220
AFOSR 670 Unclassified report

Report on Transonic Flutter.

Descriptors: (*Flat plate models, Flutter), (*Flutter simulators, Supersonic flow), Transonic characteristics, Supersonic characteris-

Descriptors: (*Incompressible flow, Cylindrical bodies), (*Bodies of revolution, Axially symmetric flow), Fluid flow, Stability, Viscosity, Matrix algebra, Vortices, Velocity, Distribution.

In a number of recent papers, effects of axial flow and of asymmetry of the disturbance have been separately investigated for inviscid modes of instability of flow between concentric rotating cylinders. In narrow gap approximation, the combined effects are treated. (Author)

AD-439 616 Div. 9
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CALCULATING THE FRICTION RESISTANCE OF A FLAT PLATE AT A ZERO ANGLE OF ATTACK IN THE REGION BETWEEN CONTINUUM AND A FREE-MOLECULAR FLOW,
by V. A. Sukhnev. 24 Sep 63, 15p.
FTD MT63 83 Unclassified report

Trans. from Izvestiya, Akademii Nauk SSSR, Otn., Mekhanika i Mashinostroyeniye, no. 3, pp. 31-37, 1962.

Descriptors: (*Flat plate models, Friction), Angle of attack, Boundary layer, Reynolds number, Gas flow, Supersonic flow, Drag, USSR.

AD-439 631 Div. 9, 31, 27
OTS price $6.60

Ordnance Research Lab., Pennsylvania State Univ., University Park, Pa.
A METHOD FOR THE DESIGN OF PUMPJETS,
by R. E. Henderson, J. F. McMahon and G. F. Wislicenus. 15 May 64, 50p.
Contract NOw 63 0209c
Unclassified report

Descriptors: (*Hydrojet engines, Design), Theory, Operation, Fluid flow, Hydrodynamics, Rotor blades (Turbomachinery), Cavitation, Vortices.

The pumpjet - a hydrodynamic propulsor - is similar to a conventional propeller rotating within a ductor shroud. The shroud permits the flow velocity through the rotor to be controlled more or less independently of the velocity of the vehicle. For certain applications, the pumpjet can be designed to have better cavitation characteristics than an open propeller; alternatively, the pumpjet can be made smaller than the conventional propeller to reduce the weight of the propelling machinery. The pumpjet may be designed on the basis of knowledge and experience gained from axial-flow compressors and pumps. The meridional flow within the shroud is assumed to be axially symmetrical. The flow through the vane system is considered, with certain restrictions, to be cylindrical. Although axial-compressor data can be used for the blade design, blade profiles suitable for compressors are not suitable for hydrodynamic propulsors because of the stringent requirements regarding cavitation. A quasi one-dimensional method of blade design is described that uses compressor data but still meets the cavitation requirements. Problems of shroud design, skewed vanes, unsteady force action, and boundary-layer intake are discussed; and problems that remain unsolved are also pointed out. (Author)

AD-439 642 Div. 9
OTS price $5.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
EXPERIMENTAL DETERMINATION OF PRESSURE, TEMPERATURE, AND DENSITY IN SOME LAMINAR HYPERSONIC NEAR WAKES,
by E. J. Softley, E. P. Muntz and R. E. Zempel. May 64, 52p. Rept. no. R645D35
Contracts AF04 647 617; AF04 694 222
Unclassified report

Descriptors: (*Wake, Hypersonic characteristics), (*Slender bodies, Wake), Reentry vehicles, Nose cones, Laminar flow, Conical bodies, Atmosphere entry, Test methods, Electron beams, Electroluminescence, Hypersonic flow, Superaerodynamics, Density, Nitrogen, Air, Temperature, Pressure, Measurement, Reynolds number, Boundary layer, Base flow.

Measurements of base pressure and axial distributions of density and static temperature were obtained for several laminar hypersonic wake flows. Experiments were performed at Mach 12 for Reynolds numbers based on model length of 7 x 10 to the 5th power and 6 x 10 to the 4th power and at Mach 18 for a Reynolds number of 5 x 10 to the 4th power. The pressure results indicate that the base pressure of a cone is a sensitive function of Reynolds number. The temperature measurements support the inclusion in theoretical analyses of the expansion distortion of the boundary layer profile at the trailing corner of a cone. The temperature measurements also show that the maximum on-axis wake static temperatures appear in the re-circulation region. (Author)

10. FUELS AND COMBUSTION

AD-437 979 Div. 10
OTS price $8.60

Aerojet-General Corp., Azusa, Calif.
RESEARCH ON NEW TECHNIQUES FOR ANALYSIS OF CONTAMINANTS IN LIQUID PROPELLANTS.
Rept. for 5 Mar 62-5 Mar 64,
by R. M. Roberts and J. R. Finkel. Mar 64, 99p.
Rept. no. 2638
Contract AF33 657 7936, Proj. 8169, Task 816902
APL TDR64 3 Unclassified report

Descriptors: (*Liquid rocket propellants, Contamination), (*Contamination, Liquid rocket propellants), (*Fuel contamination, Liquid rocket propellants), Pentaboranes, Hydrazine, Methyl hydrazines, Hydrogen peroxide, Nitrogen compounds, Tetroxides, Chlorine compounds, Fluorine compounds, Ammonia, Chromatographic analysis, Bibliographies, Reviews, Impurities, Liquid rocket fuels, Liquid rocket oxidizers.

This program was a several-phased effort aimed at improving the state of the art of propellant-contamination surveillance. Detectable contaminants in 12 different storable propellants were characterized, and coherent gas-chromatograph methods were developed for their analysis. The end item, an automatic gas chromatograph for launch-site employment, was then designed and fabricated to incorporate this developed metholology. (Author)

AD-438 664 Div. 10, 9
OTS price $2.60

Instituto Nacional de Tecnica Aeronautica, Madrid (Spain).
UNIDIMENSIONAL THEORY OF SUPERSONIC COMBUSTION,

Report on Re-entry Systems and Technology.

Descriptors: (*Base flow, Slender bodies), (*Reentry vehicles, Base flow), Wake, Radar echo areas, Electron density, Supersonic flow, Turbulence, Mathematical analysis, Atmosphere entry, Thermodynamics, Nose cones, Hypersonic characteristics, Conical bodies.

A method is developed for determining the geometry and fluid mechanical properties of the base flow region behind a slender supersonic re-entry vehicle. The analysis provides thermodynamic function profiles suitable for calculating infrared radiation, streamlines for calculating electron density formation for determining radar cross section, and starting conditions for a post neck wake calculation. An example is worked out on the basis of a non-equilibrium chemistry stream tube analysis which indicates that the radar cross section of the base flow region provides a negligible radar cross section contribution to the wake. (Author)

AD-439 220 Div. 9, 15
OTS price $3.60

General Electric Co., Philadelphia, Pa.
SOLVING NUMERICALLY THE NAVIER-STOKES EQUATIONS,
by L. Crocco. 20 Mar 64, 39p. Document no. 63SD891
Contract AF04 694 222
Unclassified report

Descriptors: (*Partial differential equations, Numerical methods and procedures), (*Hypersonic flow, Partial differential equations), One-dimensional flow, Shock waves, Viscosity, Difference equations, Boundary layer, Supersonic nozzles, Mathematical analysis, Equations.

A numerical procedure is developed for solving the complete Navier-Stokes equations; the resulting finite difference equations are analyzed for stability and the method is then applied to the determination of the viscous one-dimensional flow field in a supersonic nozzle containing a normal shock wave. It is shown that the method works and, hence, affords an extremely promising approach to the treatment of viscous flow fields involving more complex geometries. (Author)

AD-439 380 Div. 9
OTS price $1.60

Hydrodynamics Lab., Calif. Inst. of Tech., Pasadena.
A PRELIMINARY STUDY OF THE EFFECT OF THE FREE SURFACE ON A THREE-DIMENSIONAL CAVITY PRODUCED BY A CIRCULAR DISK,
by E. R. Bate, Jr. Mar 64, 15p. Rept. no. E118 15
Contract N123 60530 34767A
Unclassified report

Descriptors: (*Cavitation, Disks), Configuration, Model tests, Hydrofoils, Surfaces, Two-dimensional flow, Flat plate models, Angle of attack, Test methods, Hydrodynamics.

An experiment was performed to determine the free surface effects on a supercavitating, flat plate hydrofoil in two-dimensional flow. This is a preliminary study to determine the effects of the free surface on the geometry of a ventilated cavity. Specifically, the variation of the length of a cavity due to submergence is studied. The results are presented with the preliminary data reduced to the pertinent dimensionless parameters, uncorrected for tunnel blockage and model scale effects, if any. (Author)

AD-439 391 Div. 9, 31
OTS price $7.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
UNSTEADY LIFTING SURFACE THEORY FOR A MARINE PROPELLER OF LOW PITCH ANGLE WITH CHORDWISE LOADING DISTRIBUTION,
by Stavros Tsakonas and Winnifred R. Jacobs. Jan 64, 76p. Rept. 994
Contract Nonr26338, DL Proj. 2375 038
Unclassified report

Descriptors: (*Propellers (Marine), Propeller blades), (*Propeller blades, Load distribution), Lift, Hulls (Marine), Vibration, Integral equations, Nonequilibrium flow, Camber, Mathematical models, Acceleration, Hydrodynamics.

This study is third in a series of investigations applying the unsteady lifting surface theory to the marine propeller case. In this investigation, the surface integral equation is solved for a mathematical model where the chordwise loading is taken as the first term of Birnbaum's lift distribution (flat-plate chordwise distribution), in conjunction with Glauert's lift operator, which, in essence, satisfies the chordwise boundary conditions by a weighted average. It is shown that this model is an improvement over the modified Weissinger model used previously in this series, because it contains as a nucleus the exact two-dimensional solution, and thus it provides a sounder basis for dtermining the three-dimensional effects. The blade-loading is determined for a propeller operating in flow disturbanccs induced by the presence of a hull and by the blade-camber effect. The stationary loading obtained by the present model is about 10% less than that obtained by the modified Weissinger model, whereas the nonstationary loading is slightly larger. (Author)

AD-439 507 Div. 9
OTS price $1.60

Aerospace Information Div., Washington, D. C.
TURBULENT DIFFUSION OF HEAT AND MOMENTUM IN A HOMOGENEOUS AND ISOTROPIC TURBULENT STREAM,
by L. S. Kokorev. 1963, 13p.
AID T64 22 Unclassified report

Presented at Conference on Heat and Mass Exchange sponsored by Belorussian Academy of Sciences, the Ministry of Higher and Secondary Special Education, USSR; the Academy of Construction and Architecture, USSR and the Institute of Mechanics, AS USSR, Minsk, 1961.

Descriptors: (*Diffusion, Turbulence), (*Turbulence, Diffusion), (*Heat, Diffusion), (*Momentum, Diffusion), (*Fluid flow, Isotropism), USSR, Heat transfer, Theory, Corrections, Metals, Liquid metals, Functions, Time, Molecular properties, Equations.

AD-439 526 Div. 9
OTS price $1.60

Brown Univ., Providence, R. I., Div. of Applied Mathematics.
ASYMMETRIC INVISCID MODES OF INSTABILITY FOR SPIRAL FLOW BETWEEN TWO CONCENTRIC ROTATING CYLINDERS,
by F. E. Bisshopp and R. Y-S Lynn. Apr 64, 20p.
Rept. no. TR55
Contract Nonr56207, Proj. NR062179
Unclassified report

A LINEAR VEHICLE USING MEASURED GROUND POWER SPECTRAL DENSITY,
by John L. Bogdanoff and Frank Kozin. Nov 63, 29p.
Projs. 5022 11 82200; 33 0080RD1909
ATAC 8392 Unclassified report

Descriptors: (*Vehicles, Stability), (*Terrain, Surface properties), Velocity, Damping, Suspension devices, Vibration, Ground speed, Vehicle wheels, Design, Roadwheels, Statistical analysis, Sensitivity, Human engineering, Transportation.

An extension is presented of previous results relating the parameters of an idealized two-dimensional linear vehicle to stable ground roughness as described by power spectral densities. Optimal vehicle parameters are obtained relative to a ride roughness criterion for ground contours described by power spectral densities estimated from real ground survey data. It is found that the ride is not sensitive to changes in the wheel base length parameter when is over 14 feet. Howwver, the ride is found to be sensitive to damping and speed in this wheel basel length range. (Author)

12. GUIDED MISSILES

AD-437 972 Div. 12, 2, 27, 10
OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
THE EFFECTS OF THE ACCURACY OF ATMOSPHERE DATA ON THE STRUCTURAL DESIGN LOADS OF A TYPICAL LAUNCH VEHICLE,
by J. S. Field and D. E. Hargis. 20 Apr 64, 53p.
Rept. no. TDR269 4304 6
Contract AF04 695 269
SSD TDR63 383 Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Meteorological parameters), (*Meteorological parameters, Atmosphere models), Rocket motors (Liquid propellant), Rocket motors (Solid propellant), Design, Aerodynamic loading, Wind, Errors, Moments, Pressure, Air, Density, Temperature, Angle of attack, Launching, Free flight trajectories, Simulated environment, Structures, Stresses, Deflection, Hazards.

The effects of simulated inaccuracies of meteorological data were investigated with respect to the structural loads of two types of launch vehicles. The effects of inaccuracies ranging from + 10% to - 10% of atmospheric density, atmospheric temperature, windspeed, wind shear and wind shear length were studied. The two launch vehicles used were a liquid propellant boosted vehicle and a relatively small solid propellant boosted vehicle. (Author)

AD-438 028 Div. 12
OTS price $.50

Lockheed Aircraft Corp., Burbank, Calif.
DEVELOPMENT PLAN AND COST ESTIMATE. ADDENDUM TO A STUDY OF AN ORBITAL MAINTENANCE AND MATERIAL TRANSFER SHUTTLE.
Rept. for Feb-Oct 63,
by Ray Goodall. Mar 64, 16p.
Contract AF33 657 10290, Proj. 8170, Task 817010
RTD TDR63 4057, Add. Unclassified report

Descriptors: (*Satellites (Artificial), Space maintenance), (*Manned spacecraft, Design), Costs, Analysis, Structural parts, Control systems, Space propulsion, Power supplies, Space navigation, Guidance, Communication equipment, Test facilities.

This document is an addendum to RTD-TDR-63-4057, A Study of an Orbital Maintenance and Material Transfer Shuttle. The basic report presents a preliminary design of a one-man shuttle vehicle used to transport personnel and material between large space stations and to perform in-space maintenance operations. This addendum presents a Development Plan and a Cost Estimate for producing two shuttles. The development plan shows that the first operational flight could take place 28 months from go-ahead. A total cost of $15,000,000 is estimated. No new test facilities are required for the development of the shuttle. (Author)

AD-438 030 Div. 12
OTS price $8.10

Sylvania Electric Products Inc., Waltham, Mass.
DETAILED TEST REQUIREMENTS FOR WS-133B MINUTEMAN GROUND ELECTRONICS SYSTEM FIGURE A 14131, ANTENNA FILTER SET AN/GRA-79 EVALUATION TEST PROGRAM,
20 Feb 64, 85p. Document no. 00 264987
Contract AF04 694 261
Unclassified report

Descriptors: (*Ground support equipment, Antennas), Guided missiles (Surface-to-surface), Test methods, Military requirements, Air Force, Electrical equipment, Filters (Electromagnetic waves), Electronic equipment, Guided missile antennas, Performance (Engineering), Environment, Environmental tests, Degradation, Radio-frequency interference, Electrical properties, Temperature, Pressure, Humidity, Vibration, Air, Cooling, Power, Test equipment, High temperature research, Low temperature research, Impact shock, Handling.

This document contains the detailed requirements for the MINUTEMAN ground electronics system antenna filter set AN/GRA-79 evaluation program. (Author)

AD-438 054 Div. 12, 30
OTS price $10.10

Sylvania Electronic Products, Inc., Waltham, Mass.
WS-133B MINUTEMAN GROUND ELECTRONICS SYSTEM FIGURE A 14125, RADIO SET AN/GRC-128. DETAILED TEST REQUIREMENTS FOR EVALUATION TEST PROGRAM.
29 Nov 63, 113p. Document no. 00 264965
Contract AF04 694 261
Unclassified report

Descriptors: (*Test methods, Guided missile components), (*Radio communication systems, Guided missiles), (*Guided missile components, Radio communication systems), Specifications, Performance (Engineering), Sensitivity, Interference, Vibration, Shock (Mechanics), Environmental tests, Degradation, Military requirements, Test facilities.

This document describes the evaluation tests to be performed on a prototype model of the Radio Set AN/GRC-128, proposes a sequence for conducting these tests, and defines the extent of testing and the level at which each test will be performed. It clearly outlines test methods and objectives, but does not contain detailed test procedures. (Author)

AD-438 205 Div. 12
OTS price $6.60

Sylvania Electric Products Inc., Waltham, Mass.
WS-133B MINUTEMAN GROUND ELECTRONICS SYSTEM FIGURE A 14126, MESSAGE BUFFER UNIT MU-503/GRC-128. DETAILED TEST REQUIREMENTS FOR EVALUATION

by I. Da-Riva. 1 May 63, 26p.
Grant AF EOAR62 91
Unclassified report

Descriptors: (*Supersonic flow, Combustion), (*Combustion, Supersonic flow), Spain, Oxidizers, Chemical reactions, Theory, Fuel injection, Supersonic flight, Differential equations, High temperature research, Diffusion, Model theory, Ramjet engines.

This paper outlines a generalized unidimensional theory of supersonic combustion. It considers a stream of oxidizer flowing along a tube with lateral fuel supply governed by a certain injection law and the combustion occurring in conditions in which the pressure is kept constant. The principal results obtained by using the simple model under consideration are: (a) If the injecting of fuel does not impart kinetic energy to the flow, the mixing process, even supposing it takes place in ideal conditions, appreciably lowers the upper limit to the practicability of supersonic combustion (the dissociation limit). (b) As for the lengths required for combustion to take place, the estimate arrived at by this method is practically the same as that obtained by assuming that the mixing and the reaction are two independent processes. (c) In most of the cases considered the diffusion governs the process; in other words, the flow is closer to chemical-equilibrium than to frozen-flow conditions. (Author)

AD-439 403 Div. 10, 25
OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
SOLID PROPELLANT MECHANICAL PROPERTIES INVESTIGATIONS.
Quarterly progress rept. no. 2, 1 Jan-1 Apr 64, by Norman Fishman and James A. Rinde. 20 Apr 64, 49p. Rept. no. 6
Contract AF04 611 9559, SRI Proj. PRU4673
Unclassified report

Descriptors: (*Solid rocket propellants, Mechanical properties), (*Isocyanate plastics, Mechanical properties), Model tests, Polymers, Alkenes, Solid rocket propellant binders, Aluminum, Glass, Ammonium compounds, Perchlorates, Dilatometers, Strain (Mechanics), Loading (Mechanics), Shear stresses, Experimental data, Equations of state.

Continued progress was made toward developing a method for defining the path-independent physical state of a propellant in terms of stress-strain-time history. The general form of the dilatational state equation, developed by least squares curve fitting of all constant strain rate test data, is presented. Calculation of volume changes under all test conditions yielded values in close agreement with experimental results. Polyurethane propellant test data were processed to yield a state equation; calculations of volume changes for this propellant have not been completed. Results of preliminary studies of the effect of moisture were examined in regard to their probable influence on state equation constants. Results of all tests to date are presented in either tabular or graphical form. Preliminary results to tests of two model systems based on the polybutadiene binder (one with glass beads, the other with aluminum powder) and results of studies of the effects of moisture on dilatation are also discussed. (Author)

AD-439 644 Div. 10, 4
OTS price $5.60

Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
FLAME INHIBITION RESEARCH.
Quarterly progress rept., 1 Aug-31 Oct 63 and Yearly summary rept., 1 Nov 62-31 Oct 63. Nov 63, 60p. Rept. no. SR6 3
Contract NOw62 0604c, Proj. 8M76 05 001 03
AERDL 21 61 Unclassified report

Descriptors: (*Flames, Inhibition), (*Reaction kinetics, Flames), Halogenated hydrocarbons, Bromine compounds, Hydrogen compounds, Bromides, Hydroxides, Chemical reactions, Hydrocarbons, Oxygen, Configuration, Temperature, Chemical equilibrium, Reviews, Thermodynamics.

Rate profiles were obtained for a lean methane-oxygen flame inhibited by HBr. Hydrogen atom and hydroxyl radical composition profiles were derived for both the HBr and the CH3Br inhibited flames using known elementary rate expressions and the observed rates and compositions. The rate profiles are discussed in terms of kinetics and elementary reactions. Preliminary kinetic constants are given for the reactions HBr + OH yields H2O + Br and CH3Br + OH yields Ch2Br + H2O. (Author)

AD-439 722 Div. 10, 4
OTS price $1.60

Southwest Research Inst., San Antonio, Tex.
A STUDY OF RAPID SOLIDIFICATION OF HYDROCARBON FUELS.
Monthly progress rept. 1 Feb-1 Mar 64, by E. C. Martin. 10 Mar 64, 11p.
Contract DA44 177TC819T, Proj. 01 1176
Unclassified report

Descriptors: (*Fuels, Solids), (*Hydrocarbons, Fuels), (*Fuel additives, Hydrocarbons), Gels, Cyanates, Organic nitrogen compounds, Cyclohexanes, Jet engine fuels, Viscoelasticity, Amines, Ethers, Penetration, Hardness, Synthesis (Chemistry), Chemical reactions, Ignition, Aromatic compounds, Alkenes.

11. GROUND TRANSPORTATION EQUIPMENT

AD-438 405 Div. 11
OTS price $12.00

Army Tank-Automotive Center, Center line, Mich.
STATISTICAL STUDIES OF STABLE GROUND ROUGHNESS, by Frank Kozin, Louis J. Cote and John L. Bogdanoff. Nov 63, 166p.
Projs. 5022 11 82200; DA Proj. 33 0080RD1909
ATAC 8391 Unclassified report

Descriptors: (*Vehicles, Stability), (*Terrain, Statistical analysis), Surface properties, Programming (Computers), Tables, Velocity, Ground speed, Vibration, Transportation.

A method of estimating statistical characteristics of stable ground roughness for use in off-road land locomotion is developed. Computer programs for obtaining these estimates from survey data were prepared. Several estimated power spectral densities obtained from survey data taken at military installations are presented. Pertinent features of these estimated power spectral densities are interpretable in terms of visual features of plotted ground profiles. The estimated power spectral densities may be approximated by similar and simple form. (Author)

AD-438 406 Div. 11
OTS price $2.60

Army Tank-Automotive Center, Center line, Mich.
ADDITIONAL RESULTS ON THE STATISTICAL ANALYSIS OF

Descriptors: (*Beacons, Satellites (Artificial)), (*Guided missile ranges, Calibration), (*Satellites (Artificial), Guided missile ranges), Optical equipment, Spaceborne, Transponders, Geodesics, Xenon, Power supplies, Scientific satellites, Illumination, Circuits, Wiring diagrams, Lighting equipment, Telemeter systems, Guided missile tracking systems, Optical tracking, Navigation satellites.

A Xenon flash system is derived which can meet all the needs of the proposed Range Calibration Satellite. The resulting optical beacon will fulfill the demanding light output requirements of the stellar cameras to be used for range calibrations and at the same time come within the severe constraints imposed by the satellite itself. Supporting studies have been made of ANNA-1-B telemetry data, photographic plates have been analyzed, and an emulsion selection study has been performed. The total design effort leans heavily on the ANNA experience - the first successful satellite with a xenon flash optical beacon aboard. The results of the study are presened in three separately bound volumes. (Author)

AD-438 873 Div. 12, 8
OTS price $9.60

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE.
Final rept.,
by F. T. Gronberg, R. I. Saunders and C. Warner.
23 Feb 64, 115p. Rept. no. B2730
Contract AF19 628 2979, Proj. 5930, Task 593003
AFCRL 64 125, pt. 2 Unclassified report

Report on Preliminary Design & Specification Study.

Descriptors: (*Beacons, Satellites (Artificial)), (*Guided missile ranges, Calibration), (*Satellites (Artificial)), Guided missile ranges), Optical equipment, Spaceborne, Lighting equipment, Xenon, Geodesics, Scientific satellites, Capacitors, Direct current, Voltage regulators, Sequence switches, Telemeter systems, Reliability (Electronics), Reflectors, Transponders, Power supplies, Circuits, Wiring diagrams, Electronic equipment, Electrical equipment, Xenon lamps, Guided missile tracking systems, Optical tracking, Navigation satellites.

A xenon flash system is described which can meet all the needs of the proposed Range Calibration Satellite. The resulting optical beacon will fulfill the demanding light output requirements of the stellar cameras to be used for range calibrations and at the same time come within the severe constraints imposed by the satellite itself. Supporting studies have been made of ANNA-1B telemetry data, photographic plates have been analyzed, and an emulsion selection study has been performed. The total design effort leans heavily on the ANNA experience - the first successful satellite with a xenon flash optical beacon aboard. The results of the study are presented in three spearately bound volumes. (Author)

AD-438 874 Div. 12, 8
OTS price $1.60

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE.
Final rept.,
by F. T. Gronberg, R. I. Saunders and C. Warner.
23 Feb 64, 15p. Rept. no. B2730
Contract AF19 628 2927, Proj. 5930, Task 593003
AFCRL 64 125, pt. 3 Unclassified report

Report on Preliminary Design & Specification Study.

Descriptors: (*Beacons, Satellites (Artificial)), (*Guided missile ranges, Calibration), (*Satellites (Artificial), Guided missile ranges), Optical equipment, Spaceborne, Geodesics, Xenon, Scientific satellites, Lighting equipment, Scheduling, Costs, Xenon lamps, Guided missile tracking systems, Navigation satellites, Optical tracking.

A xenon flash system is described which can meet all the needs of the proposed Range Calibration Satellite. The resulting optical beacon will fulfill the demanding light output requirements of the stellar cameras to be used for range calibrations and at the same time come within the severe constraints imposed by the satellite itself. Supporting studies have made of ANNA-1B telemetry data; photographic plates have been analyzed, and an emulsion selection study performed. The results of the study are presented in three separately bound volumes. (Author)

AD-438 922 Div. 12
OTS price $6.60

Boeing Co., Seattle, Wash.
FTM 444, MODEL SPECIFICATION S-133-1000-0-1.
Acceptance summary rept.,
by J. H. Kirby. 17 Apr 64, 66p. Document no. D2 3929 444
Contract AF04 694 422
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Acceptability), Guided missile components, Effectiveness, Specifications, Flight testing.

An Acceptance Summary Report is presented for Flight Test Missiles as required to support final acceptance activities at the Boeing Test Site. It provides evidence of Missile Configuration Identification and Certification. It defines deviations from compliance with the Airborne Vehicle Model Specification, S-133-1000-0-1. (Author)

AD-438 958 Div. 12
OTS price $6.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT - FTM 445,
by J. H. Kirby. 5 May 64, 65p. Document no. D2 3929 445
Contract AF04 694 422
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Acceptability), Specifications, Military requirements, Tests, Visual inspection, Compatibility, Flight testing, Test vehicles, Guided missile components, Reentry vehicles, Batteries & components, Guidance, Control, Quality control.

The purpose of D2-3929 is to document an Acceptance Summary Report for flight test missiles as required to support final acceptance activities at the Boeing Test Site. It provides evidence of Missile Configuration Identification and Certification. It defines deviations from compliance with the Airborne Vehicle Model Specification, S-133-1000-0-1; of Reference Document D2-6272,

TEST PROGRAM.
20 Dec 63, 65p. Document no. 00 264971
Contract AF04 694 261
Unclassified report

Descriptors: (*Ground support equipment, Input-output devices), Electronic equipment, Tests, Synchronization (Electronics), Radio communications system, Test methods, Design, Calibration, Reliability, Degradation, Environment, Radiofrequency interference, Data, Performance (Engineering), Guidance, Control, Signals, Radio equipment, Environmental tests, Humidity, Fungus deterioration, High temperature research, Impact shock, Vibration, Temperature, Specifications, Sensitivity.

This document contains the detailed test requirements for the Evaluation Test Program for the Message Buffer Unit MU-503/GRC-128, Figure A 14126, of the Minuteman Ground Electronics System. (Author)

AD-438 506 Div. 12
OTS price $2.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
AB-3 STABILIZING GYRO DEVELOPMENT PROGRAM PLAN,
by J. V. Johnston. 1 Apr 64, 30p.
Proj. 1B279191D678
AMC RA RG TR64 1
Unclassified report

Descriptors: (*Gyroscopes, Inertial guidance), Air, Gimbals, Deflection, Time, Stability, Data, Power, Voltage, Excitation, Frequency, Acceleration, Torque, Temperature, Bearings, Materials, Rotation, Magnetic properties, Stabilized platforms, Guidance, Research program administration.

This report is the internal design concept and development plan for an improved air-bearing gyro (AB-3). This report will also be used as a guide for the in-house development and testing of the AB-3 stabilizing gyro. This design concept is a result of a study conducted by the Army Inertial Guidance and Control Laboratory to develop an advanced inertial platform (ST-323). (Author)

AD-438 517 Div. 12
OTS price $5.00

Lockheed Aircraft Corp., Burbank, Calif.
A STUDY OF AN ORBITAL MAINTENANCE AND MATERIAL TRANSFER SHUTTLE.
Final technical rept., Feb-Oct 63,
by Ray Goodall. Mar 64, 373p. Rept. no. LR17031
Contract AF33 657 10290, Proj. 8170, Task 817010
RTD TDR63 4057 Unclassified report

Report on Design Study for an Orbital Maintenance and Material Transfer Shuttle.

Descriptors: (*Rendezvous spacecraft, Feasibility studies), (*Manned spacecraft, Air transportation), Space maintenance, Space capsules, Maintenance personnel, Logistics, Weight, Training devices, Launch vehicles (Aerospace), Transfer trajectories, Rocket motors (Liquid propellant), Performance (Engineering), Thrust, Hazards, Aviation safety, Maintenance, Velocity, Space environmental conditions, Human engineering, Costs, Space-to-space, Adhesive tapes, Design, Flight control systems, Fuel consumption, Satellites (Artificial), Maneuverability, Rendezvous, Acceleration, Target discrimination, Illumination, Guidance, Space stations, Control systems.

A conceptual study of an orbital maintenance and material transfer shuttle is presented. The shuttle is a one-man vehicle used for transporting personnel and materials between other orbiting vehicles and for performing maintenance and repair on space stations or unmanned satellites. The application of the shuttle to existing and proposed space systems is examined and found to be feasible and economically advantageous. The trade-offs between range, duration, propulsion and on-board power systems are presented and design values selected. A simple guidance technique using a short-range radar is formulated. Results of simulated maintenance experiments conducted with a worker in a pressure suit are reported and integrated into the shuttle design. (Author)

AD-438 720 Div. 12, 27
OTS price $7.60

Aerospace Corp., Los Angeles, Calif.
BIBLIOGRAPHY OF REPORTS.
Final rept., 1 Jul 62-30 Jun 63,
comp. by B. H. Peer and S. T. Keasbey. 24 Apr 64,
72p. Rept. no. CSR169 9990FBR1
Contract AF04 695 169
Unclassified report

Supersedes report nos. CSR169 9990 QBR2, AD-297 864, and CSR169 9990 QBR3, AD-402 241.

Descriptors: (*Bibliographies, Reports), (*Reports, Index), Manned spacecraft, Space capsules, Launch vehicles (Aerospace), Satellites (Artificial), Ground support equipment, Communication satellites, Guided missiles (Surface-to-surface), Reentry vehicles, Spacecraft.

AD-438 856 Div. 12
OTS price $ 4.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
ON THE MECHANISM OF BUCKLING OF A CIRCULAR CYLINDRICAL SHELL UNDER LONGITUDINAL IMPACT.
Final rept.,
by Anthony P. Coppa. 30 June 61, 46p. Rept. no. R60SD494
Unclassified report

Presented at the Tenth International Congress of Applied Mechanics, 31 Aug-7 Sep 60, Stresa, Italy.

Descriptors: (*Structural shells, Buckling (Mechanics)), Cylindrical bodies, Reentry vehicles, Theory, Stresses, Deformation.

Contents: Stresses Due To Impact; Impact By an Infinite Mass: Initiation of instability, Critical length for inextensional buckling, Postbuckling behavior, Secondary buckling, Effect of internal pressure; Impact By a Finite Mass: Instability, Postbuckling behavoir, Secondary buckling; and Experimental buckling behavior: Buckling at the impacted end, Inextensional nature of buckling, and Change of buckle pattern during postbuckling. (Author)

AD-438 872 Div. 12, 8
OTS price $6.60

Edgerton, Germeshauser, and Grier, Inc., Boston, Mass.
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE.
Final rept.,
by F. T. Gronberg, R. I. Saunders and C. Warner.
23 Feb 64, 63p. Rept. no. B2730
Contract AF19 628 2979, Proj. 5930, Task 593003
AFCRL 64 125, pt. 1 Unclassified report

stresses, Adhesives, Glass textiles, Bearings, Elasticity, Thermal expansion, Aluminum alloys, Material, Mechanical properties, Bonding.

This report summarizes work accomplished by the Case Design Group, Hercules Powder Company, Bacchus Works, for the continued development of the Minuteman M-57E1 Rocket Motor. (Author)

AD-439 511 Div. 12
OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
A COMPARATIVE SURVEY OF TYPES OF SPACE STABILIZATION FOR TELEVISION SYSTEMS,
by George R. Lewis. Mar 64, 18p.
NOTS TP3403; NAVWEPS 8446 Unclassified report

Descriptors: (*Television guidance, Camera tubes), (*Stabilization systems, Television equipment), Stabilization systems, Airborne, Pitch (Motion), Television cameras, Stabilization, Yaw, Reduction, Gyroscopes, Gimbals, Gyro stabilizers, Camera lenses, Guided missiles.

Vidicon camera tubes have been put to use in many weapons systems, some of which require space stabilization of the television portion to lessen or eliminate vehicular motions. This report describes and classifies the major types of space stabilization possible and compares the advantages and disadvantages of each type. (Author)

AD-439 518 Div. 12, 1
OTS price $2.60

Naval Missile Center, Point Mugu, Calif.
EVALUATION OF THE COMPATIBILITY OF THE AQM-37A TARGET AND LAU-24/A LAUNCHER WITH THE F-4B LAUNCH AIRCRAFT,
by W. M. Horton. 31 Mar 64, 21p.
Task RM4501 001
NMC TM64 13 Unclassified report

Descriptors: (*Target drones, Aerial targets), Drones, Navy, Jet fighters, Captive tests, Compatibility, Aircraft, Simulation, Compatibility, Malfunctions, Launching, Flight testing, Rocket motors (Liquid propellant), Tests, Checkout procedures, Guided missiles.

The AQM-37A target is a preporgrammed, high-performance, air-launched, liquid-fueled, rocket-propelled, expendable missile target designed for launch from many types of military aircraft. The aerodynamic, structural, and electrical compatibilities of the AQM-37A target and the LAU-24/A launcher with the F-4B aircraft were evaluated. Prior to this evaluation the target had been launched only from F-3B and A-4B aircraft. The evaluation, consisting of ground tests and flight tests, indicates that the centerline station of the F-4B aircraft is readily converted to a very satisfactory launch platform for the AQM-37A target. Launches within the subsonic flight regime at altitudes between 30,000 and 40,000 feet have been conducted without producing any effect detectable by the pilots or through observation of films upon the flight capabilities or characteristics of the aircraft. (Author)

AD-439 618 Div. 12, 25
OTS price $6.60

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
APPLICATIONS OF THE HALL EFFECT SEMICONDUCTOR MULTIPLIER,
by Carlo Venditti. Nov 63, 61p. Rept. no. R 426
Contract Nosp64042C, DSR Proj. 53 209
Unclassified report

Report on Polaris FBM Guidance System.

Descriptors: (*Semiconductor devices, Hall effect), Measurement, Test equipment, Indium alloys, Arsenides, Antimony alloys, Arsenic alloys, Voltage, Electric currents, Temperature, Ground (Electrical), Resistance (Electrical), Frequency, Low frequency, Ultrahigh frequency, Circuits, Amplifiers, Power, Temperature, Fourier analysis, Error, Magnetic fields, Guidance, Guided missiles (Underwater-to-surface), Guided missiles (Surface-to-surface), Navy.

A detailed explanation of the Hall Effect and a description of the present available commercial units used in the construction of a watt meter and a voltage-monitoring unit are given. (Author)

AD-439 662 Div. 12, 22
OTS price $8.10

Army Frankford Arsenal, Philadelphia, Pa.
PROPELLANT ACTUATED DEVICES.
Progress rept., Nov-Dec 63.
Dec 63, 86p.
AFA 91 1 Unclassified report

Descriptors: (*Explosive actuators, Abstracts), (*Propellants, Abstracts), (*Cartridges (PAD), Abstracts), (*Abstracts, Scientific research), Safety devices, Rocket motors (Solid propellant), Rocket motors (Hybrid propellant), Delay elements (Explosive), Fuzes (Ordnance), Catapults, Ejection, Ejection seals, Automation, Bomb ejectors, Gas generating systems, Life rafts, Air-sea rescues, Parachutes, Manned spacecraft.

Contents: High Temperature Propellants for Crew Escape System Rockets; Feasibility of a Hybrid Rocket for Crew Escape Capsule Application; Propellant Actuated Devices in Space Environment; Close Tolerance Delay; Ancillary Components for Escape Systems; Mild Detonating Fuse (MDF); Components for Electrically Initiated Escape Systems; Co-Axial Catapult; Time Delay Mechanism; Dyna-Soar Technical Assistance; XM18 Gas Generator; Characteristics of Dynamic Seals, Sealing Materials, and Sealing Techniques for PAD; Improved Propellants and Primers for PAD Applications; Investigation of Recently Developed Materials and Manufacturing Techniques for Application to PAD; Improvement of PAD to Eliminate Toxic Propellant Gases (2 Reports); Medium Performance Miniature Initiator; Development of Ballistic Reel; Gun Launched Rocket; Rocket Altitude Sensing and Thrust Direction Control; Development of Twenty-Man Life Raft Inflator; Heavy-duty Pyrotechnic Delay Reefing Line Cutter; and Bomb Ejector Cartridge for MAU-12/A Bomb Rack.

AD-439 680 Div. 12
OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT AEROBEE KP 3.3,
by Gordon L. Dunaway. Jan 64, 43p.
Task 1G6 502121127 02
AERDA 103 Unclassified report

Descriptors: (*Meteorology, Data), (*Wind, Special purpose computers), (*Ballistics, Tables), Rockets, Impact shock, Mathematical prediction.

Missile Function Test Procedures, for a record of testing performed and for specified Acceptance Test Measurements; also for Reference D2-9611, Failure and Time/Cycle data, and for a record of Reliability Data. (Author)

AD-439 201 Div. 12
OTS price $22.25

Bendix Corp., Southfield, Mich.
APPLICATION OF HIGH MOMENT-PRODUCING TECHNIQUES FOR CONTROL OF A MANNED SPACE VEHICLE.
Final Rept.
Mar 64, 402p.
Contract AF33 657 10998, Proj. 8225, Task 822503
FDL TDR64 32 Unclassified report

Descriptors: (*Attitude control systems, Manned spacecraft), (*Manned spacecraft, Attitude control systems), Maneuverability, Reentry vehicles, Rendezvous trajectories, Transfer trajectories, Flight control systems, Thrust vector control systems, Aerodynamic control surfaces, Secondary injection, Control jets, Gyroscopes, Spacecraft docking, Simulation, Analog systems, Torque, Retro rockets, Lift, Descent trajectories, Flywheels, Flaps.

High moment-producing techniques are applied to the attitude control of manned space vehicles which perform orbital transfer, rendezvous, and lifting re-entry maneuvers. The specific accomplishments were: (1) establishment of control system, subsystem and component requirements for critical vehicle flight phases, and (2) analysis of promising techniques for performing the flight control functions required during the various maneuvers. (Author)

AD-439 202 Div. 12, 27
OTS price $6.60

Bendix Corp., Southfield, Mich.
APPLICATION OF HIGH MOMENT-PRODUCING TECHNIQUES FOR CONTROL OF A MANNED SPACE VEHICLE.
Final summary rept.
Mar 64, 63p.
Contract AF33 657 10998, Proj. 8225, Task 822503
FDL TDR64 32 Unclassified report

Descriptors: (*Manned spacecraft, Attitude control systems), (*Reentry vehicles), Rendezvous spacecraft, Flight control systems, Ascent trajectories, Parking orbit trajectories, Rendezvous trajectories, Spacecraft docking, Separation, Transfer trajectories, Descent trajectories, Mission profiles, Analog systems, Mathematical models, Digital computers, Models (Simulation), Motion, Flight paths, Thrust vector control systems, Gyroscopes, Flywheels, Secondary injection, Control jets, Fuel systems Control systems, Energy management, Servomechanisms, Aerodynamic control surfaces.

The application is studied of high moment-producing techniques for the attitude control of manned space vehicles which perform orbital transfer, rendezvous, and lifting re-entry maneuvers. The specific accomplishments were: (a) establishment of control system, subsystem and component requirements for critical vehicle flight phases, and (b) analysis of promising techniques for performing the flight control functions required during the various maneuvers. A hypothetical vehicle was selected and its space mission was analyzed to determine the attitude control requirements. The rendezvous and re-entry maneuvers were found to be especially demanding on the attitude control system. (Author)

AD-439 358 Div. 12, 6, 8, 7
OTS price $6.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
A SUMMARY OF CONFIGURATION DESIGN STUDIES FOR A RANGE INSTRUMENTATION CALIBRATION SATELLITE,
by Joseph J. Blum. 31 Mar 64, 68p.
Proj. 5930, Task 5930 03
ESD TDR64 255 Unclassified report

Descriptors: (*Navigation satellites, Guided missile tracking systems), (*Satellites (Artificial), Geodesics), (*Guided missile ranges, Calibration), Instrumentation, Radar tracking, Radar beacons, Transponders, C-band, Optical tracking, Electronic flash, Xenon, Design, Attitude control systems, Flywheels, Electronic equipment, Command and control systems, Telemeter systems, Feasibility studies.

The results are summarized of five separate but related analytical investigations into the engineering design of a calibration satellite. The suitability and adaptability of the MISTRAM, GLOTRAC, and AN/DPN-66 C-Band radar transponders, and xenon flash optical beacon, for use in a proposed calibration satellite is discussed. The over-all results of a separate satellite integration study are likewise presented. Design specifications have been developed which allow initiation of transponder development. The electronic transponders required in a calibration satellite can be developed essentially from existing missile-rated designs. (Author)

AD-439 433 Div. 12, 5
OTS price $10.50

International Electric Corp., Paramus, N. J.
TEST REPORT ON 465L/TITAN II RADIO TRANSMISSION INTERFACE.
Jan 64, 134p.
Contract AF19 626 8
ESD TDR64 250 Unclassified report

Descriptors: (*Radio transmission, Guided missiles (Surface-to-surface)), Tests, Experimental data, Radio communication systems, Ground support equipment, Compatibility, Test methods, Simulation, Signal-to-noise ratio, Signals, Performance (Engineering), Errors, Analysis.

IEC Document 20147B served as the basis for this test activity. This Technical Documentary Report reflects the results as applied to IEC 20147B, and the conclusions resulting therefrom. The results of the interface of 465L equipment with the Intercomplex Radio Communication Equipment were satisfactory. (Author)

AD-439 493 Div. 12, 27
OTS price $9.10

Hercules Powder Co., Magna, Utah.
WEAPON SYSTEM 133A. SUMMARY OF WING II CASE DESIGN STUDIES,
by K. V. Latt. 15 May 64, 109p. Rept. no. MTI489
Contract AF04 647 243
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Rocket cases), Guided missiles (Surface-to-surface), Research program administration, Third-stage motors, Stresses, Strain (Mechanics), Weight, Environmental tests, Performance (Engineering), Weight, Pressure, Tests, Failure (Mechanics), Loading (Mechanics), Design, Load distribution, Air Force, Rubber, Instrumentation, Temperature, Time, Shear

TION TO AIR-SUPPORTED MOLDS,
by S. B. Swenson and Abraham Perez. 3 Mar 64, 35p.
Task 1D643303D550 04
AERDL TR1769TR Unclassified report

Descriptors: (*Shelters, Expanded plastics), (*Expanded plastics, Shelters), Inflatable structures, Isocyanate plastics, Reinforcing materials, Steel, Glass textiles, Polyester plastics, Laminates.

This report covers the fabrication of two rigid foam plastics shelters by spray application of plastic resins to the inside surface of air-inflated molds. The first shelter was constructed of sprayed polyurethane foam with steel rib reinforcement. The second shelter was constructed of sprayed glass fiber-polyester laminate with sprayed polyurethane core. The report concludes that the disadvantages of the spray method of fabrication far outweight the advantages. (Author)

AD-437 932 Div. 14
OTS price $6.60

Forest Products Lab., Madison, Wis.
COMPARISON OF WOOD PRESERVATIVES IN STAKE TESTS. Progress rept. for 1964,
by J. Oscar Blew, Jr., Apr 64, 64p. Rept. no. 1761
FPL 02 Unclassified report

Descriptors: (*Wood, Preservation), (*Preservation, Effectiveness), Protective treatments, Coatings, Impregnation, Creosote, Mineral oils, Degradation, Copper compounds, Zinc compounds, Mercury compounds, Chlorine compounds, Phenols, Cycloalkanes, Carboxylic acids, Aromatic compounds, Processing, Molds (Organisms), Metalorganic compounds.

Test stakes of southern yellow pine sapwood 2 by 4 in. (nominal) by 18 in. in size were treated by pressure and nonpressure processes and installed by the Forest Products Laboratory and cooperators in decay and termite exposure sites at various times since 1938. Also included in the tests are smaller pine stakes and those of treated and untreated plywood, modified woods, laminated paper plastic, and pine infected with Trichoderma mold. Southern yellow pine untreated control stakes have had an average life of about 1 year in the Canal Zone, 2 to 3 years in Mississippi, Florida, and Louisiana, and about 6 years in Wisconsin. Superficial treatments by dipping and brushing with preservatives such as coal-tar creosote and petroleum oils containing copper naphthenate, zinc naphthenate, phenyl mercury oleate, and pentachlorophenol have added a few months to 4 years to the life of the untreated stakes. (Author)

AD-437 980 Div. 14, 17
OTS price $5.60

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Mary F. Banks, Apr 64, 51p.
Contract AF33 615 1121, Proj. 8975
Unclassified report

Descriptors: (*Materials, Abstracts), (*Abstracts, Materials), Alloys, Metals, Cobalt alloys, Nickel alloys, Steel, Stainless steel, Aluminum, Beryllium, Titanium, Graphite, Ceramic materials, Refractory metals, Coatings, Composite materials.

AD-437 997 Div. 14, 7
OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
CHARACTERIZATION OF CELLOPHANE AS AN IONIC BARRIER,
by Claudia C. Evans. May 64, 21p.
NOL TR63 225 Unclassified report

Descriptors: (*Cellulosic plastics, Battery separators), (*Battery separators, Cellulosic plastics), Physical properties, Wet cells, Electrodes, Silver, Zinc, Silver compounds, Oxides, Electrolytes, Potassium compounds, Hydroxides, Bibliographies.

Cellophane, a gel developed from crystalline alphacellulose, has been used as an ionic barrier (battery separator) in electrical batteries with outstanding success for many years. Understanding the mechanism of the cellophane action in ionic barrier applications could lead to the development of superior ionic barriers. A literature survey has been conducted on the characteristics of cellophane as related to electrochemical cell barrier applications. The physical or chemical bonding of ions in electrolyte solutions to molecules in the membrane, or the catalytic complexing of undesirable ions appear to be much more important in the effective operation of cellophane as a barrier than the filtering or capillary diffusion actions, although these latter actions cannot be ignored. (Author)

AD-438 020 Div. 14
OTS price $1.60

Forest Products Lab., Madison, Wis.
OVERLAYS FOR LUMBER--AN OLD PRODUCT IN A NEW DRESS,
by H. O. Fleischer and B. G. Heebink. Apr 64, 14p. Rept. no. FPL 035
Unclassified report

In cooperation with Wisconsin U., Madison.

Descriptors: (*Wood, Protective coverings), (*Protective coverings, Wood), (*Preservation, Wood), Wood pulp, Paper, Phenolic plastics, Processing, Coatings, Plastic coatings, Adhesives, Bonding, Finishes and finishing.

The dimensional movement across the grain of nominal 1-inch pine lumber is greatly reduced when the lumber is overlaid on both sides with a suitable resin-impregnated kraft sheet whose machine direction is parallel to the lumber grain. Certain vulcanized fiber sheets as well as parchmentized paper sheets can be bonded to only one side of a flat-grain pine board so that the machine direction of the sheet is paralled to the grain of the lumber, and littler or no increase in warping tendencies occurs. The paint retention characteristics of lumber siding such as flat-grain southern pine or other species are greatly improved by the use of overlays. Overlay materials of this type should form a suitable base material for factory application of finishes for exterior service. Lumber manufacturers are also looking at other synthetic film-finishing materials, which incorporate both the overlay and the finish in a single film to be bonded to the surface. The most promising of these at the present time appear to be chlorosulfonated polyethylene and polyvinyl fluoride. (Author)

AD-438 021 Div. 14
OTS price $1.60

Forest Products Lab., Madison, Wis.
WOOD FOR USE IN BULK STORAGE STRUCTURES,
by Lyman W. Wood. Mar 64, 17p. Rept. no. FPL 041
Unclassified report

Meteorological data gathered for the launching of Aerobee KP 3.3 are presented for the U. S. Naval Research Laboratory and for ballistic studies. The data appear, along with calculated ballistic data. (Author)

AD-439 718 Div. 12
OTS price $4.60

Lockheed Missiles and Space Co., Palo Alto, Calif.
APPLICATION OF MOBILE DRYDOCK LAUNCH SYSTEM TO SPACE MISSIONS. VOLUME 1 SUMMARY.
Final rept.
25 Nov 63, 47p. Rept. no. LMSC B086121 1; 4 34 63 2
Contract NBy 45852
Unclassified report

In cooperation with Holmes and Narver, Inc., Los Angeles, Calif., Puget Sound Bridge and Dry Dock Co., Seattle, Wash., and Crandall Dry Dock Engineers, Inc., Cambridge, Mass.

Descriptors: (*Guided missile launchers, Dry dock equipment), (*Launching sites, Drydock equipment), Cost, Launching, Mobile, Ocean, Launch vehicles (Aerospace), Guided missiles (Surface-to-surface), Ground support equipment, Logistics, Maintenance, Safety, Scheduling, Handling, Propellants, Operation, Booster motors, Guided missile ranges, Personnel, Storage, Barges, Reliability.

This volume summarizes the investigation and evaluation of semimobile drydock launch systems applied to the launching of space missions. It presents briefly the objectives, scope, technical approach, and concepts that have been developed under the study for launching Atlas, Titan, and Saturn class space vehicles from semimobile drydock launch platforms at remote equatorial sites, or offshore the Atlantic Missile Range (AMR), or the Pacific Missile Range (PMR). It also indicates conclusions and recommendations for further study. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-437 961 Div. 13
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
EXPERIMENTAL STUDY OF CONTACT HEAT EXCHANGE
by M. E. Aerov, tr. by Ingeborg V. Baker.
15 Apr 64, 12p.
RSIC 162 Unclassified report

Trans. from Kholodilnaya Tekhnika 40:1, pp. 37-40, 1963.

Descriptors: (*Heat exchangers, Heat transfer), (*Thermal conductivity, Cooling & ventilating equipment, Refrigerant condensers, Coolants, Evaporators, Water, Foams, Gases, Hydrocarbons, Butane, Separation, USSR.

Reduction of irreversible losses in evaporators and condensers in compression refrigeration plants, may be achieved by lowering the differences of temperatures in these devices. Minimum temperature differences may be obtained by substituting the surface evaporators and condensers with devices of direct contact. Such an exchange will simplify the construction of the devices and reduce the expenditures of pipes. (Author)

AD-437 991 Div. 13
OTS price $3.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
COPES-VULCAN DIVISION BLAW-KNOX COMPANY MODEL D-4 ROTARY SOOT BLOWER HEAD,
by Leo F. Lauter. 26 Mar 64, 31p.
Proj. B 431
NBTL NSM 611 077 Unclassified report

Descriptors: (*Blowers, Exhaust systems), (*Boilers, Blowers), Cams, Combustion products, Mechanical drawings, Tests, Pressure, Exhaust valves, Torque, High-pressure valves, Orifices, Nozzles, Rotary valves.

The requirement that bidders on new boiler designs offer soot blower heads with integral, adjustable pressure control led to the development and evaluation of the Copes-Vulcan D-4 soot blower head. Tests were conducted to determine operability of the proposed design and to permit evaluation of modifications recommended as a result of initial test. Modifications were required to achieve correct range of head pressures, reduce torque necessary to operate the head, and to eliminate valve stem breakage. Production units of this design intended for DDG-15 were initially unsatisfactory due to inadequate control of head pressure; so modified valve assemblies were provided. Later, a modified cam design and another design valve assembly were incorporated. Inadequate pressure control, which permitted pressure to surge, existed during the opening and closing phases of the blowing cycle, but the blower exhibited adequate control while the valve was at maximum opening. Because of the ease with which head pressures can be adjusted, this design is considered satisfactory for Naval use. (Author)

AD-439 382 Div. 13
OTS price $7.60

National Engineering Science Co., Pasadena, Calif.
A THEORETICAL ANALYSIS OF STRESS WAVE INTERACTIONN IN A MODEL SOIL - FURTHER STUDIES.
Final rept.,
by A. M. Soldate and J. Miklowitz. Apr 64, 77p.
Contract AF29 601 5395, Proj. 1080, Task 108010
WL TDR64 12 Unclassified report

Descriptors: (*Soil mechanics, Theory), Elasticity, Plasticity, Compressive properties, Soils, Physical properties, Mathematical analysis, Mechanical waves, Stresses, Partial differential equations.

Two formal solutions are given to the plane strain problem of the interaction of a stress wave propagated in a bilinear plastic medium with an infinitely rigid-infinitely dense cylinder embedded in the medium. The two solutions are essentially complementary with respect to points of theoretidal difficulty and deficiencies in generality. A numerical study of each solution should lead to further development of a completely general method for treating the problem under consideration or similar problems. (Author)

14. MATERIALS (NON-METALLIC)

AD-437 901 Div. 14, 13
OTS price $3.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
RIGID FOAM PLASTICS SHELTERS BY SPRAY APPLICA-

pressure. A second panel postcured under 50 psi pressure did not blow apart but the skin-to-core bond was ruined as shown by flatwise tension tests. Neither Dynabond 132 nor a brazed panel had any permanent set after 10 hours at 420 F and after 30 minutes at 490 F, the average for three Dynabond 132 panels was .005 in. as compared to .009 in. for two brazed panels. (Author)

AD-438 145 Div. 14, 26
OTS price $6.60

Narmco Industries, Inc., San Diego, Calif.
SILICA FIBER FORMING AND CORE SHEATH COMPOSITE FIBER DEVELOPMENT.
Final summary technical rept., 1 Jan-31 Dec 63. 31 Jan 64, 70p.
Contract N600 19 59607
Unclassified report

Descriptors: (*Composite materials, Manufacturing methods), (*Material forming, Fibers), (*Ceramic materials, Processing), (*Fibers, Quartz), Bushings, Molybdenum, Tungsten, Drawing (Machine processing), Tensile properties, Controlled atmospheres, Argon, Helium, Oxides, Aluminum compounds, Dioxides, Zirconium compounds, Titanium compounds, Magnesium compounds, Calcium compounds, Manganese compounds, Phosphates, Sodium compounds, Fluorides, Sulfides, Copper compounds, Barium compounds, Titanates.

Silica Fiber Forming: Continuous fused quartz fiber forming was achieved from melts contained in both molybdenum and tungsten bushings operated in an argon atmosphere. Fiber forming temperatures ranged from approximately 2150 C to 2300 C. Tungsten was superior to molybdenum as a bushing material. Fiber forming in helium atmosphere was unsuccessful. Fiber tensile strengths were widely scattered with maximum values of 500,000 psi being achieved. An optimum tungsten bushing design had not yet been achieved and the useful bushing life was 4 hours at the end of the program. Core-Sheath Fibers: Using a redraw method of fused quartz, Vycor, and Pyrex tubing charged with candidate core materials, the feasibility of the core-sheath fiber was demonstrated with cores of A203, ZrO2, and other high modulus polycrystalline materials. (Author)

AD-438 206 Div. 14
OTS price $3.60

Southern Research Inst., Birmingham, Ala.
THE DETERMINATION OF DESIGN CRITERIA FOR GRADE CFZ GRAPHITE.
Progress report no. 3, 1 Jan-31 Mar 64, 30 Apr 64, 33p.
Contract AF33 657 11298
Unclassified report

Descriptors: (*Graphite, Physical properties), (*Density, Graphite), Strain (Mechanics), High-temperature research, Strain gages, Shear stresses, Radiography.

AD-438 403 Div. 14
OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EVALUATION OF MARK I CRYOPANEL COATINGS,
by J. P. Dawson and B. A. McCullough. May 64, 34p.
Contract AF40 600 1000, Task 895107
AEDC TDR64 85 Unclassified report

Descriptors: (*Copper, Finishes and finishing), (*Coatings, Cryogenics), Space environmental conditions, Paints, Low-pressure research, Low-temperature research, Adhesion, Reflection, Degassification.

This report is an evaluation of various paints and surface coatings for use on copper cryopanels in the Aerospace Environmental Chamber, Mark I. Results are presented on the reflectance, outgassing, and adhesive properties of the coatings. (Author)

AD-438 470 Div. 14, 1
OTS price $1.10

General Dynamics/Fort Worth, Tex.
''K'' FACTOR DETERMINATION OF FOUR TYPES OF PANEL CONSTRUCTION IN F-111 AIRPLANE,
by M. S. Staggs. 15 Apr 64, 8p. Rept. no. FTDM3174
Unclassified report

Descriptors: (*Thermal insulation, Airplane panels), (*Airplane panels, Thermal insulation), (*Glass textiles, Thermal insulation), Sandwich panels, Thermal conductivity, Composite materials, Glass, Spheres, Aluminum, Expanded plastics, Adhesives, Jet fighters, Fuel tanks.

Thermal conductivity measurements were made on panels designed to insulate certain areas of the F-111 airplane fuel tank. Four general types of panels were tested: Type I. All fiberglass panels exhibited the lowest ''K'' factors of all panels at mean temperatures below 300 F. Type II. An aluminum skin-fiberglass core panel exhibited a steep slope when ''K'' was plotted against temperature. Type IV. Microglass balloon filled panel tests revealed that higher glass concentrations of the coating result in lower ''K'' factors. (Author)

AD-438 471 Div. 14
OTS price $4.60

General Dynamics/Fort Worth, Tex.
DEVELOPMENTS IN THERMAL-STRUCTURAL COMPOSITES AT GENERAL DYNAMICS/FORTH WORTH,
by M. S. Howeth, H. R. Thornton and J. E. Burroughs. 15 Apr 64, 45p. Rept. no. FZM4037
Unclassified report

Descriptors: (*Thermal insulation, Structural parts), (*Materials, Thermal insulation), Heat shields, Refractory coatings, Ablation, Emissivity, Erosion, Oxidation, Plastics, Composite materials, Mechanical fasteners, Refractory metals, Protective treatments, Metal coatings, Aluminum alloys, Tin alloys, Vapor plating, High-temperature research, Reentry vehicles, Niobium alloys, Ceramic materials, Porous materials, Silicone plastics, Expanded plastics, Stainless steel, Flame spraying, Plasma jets.

The developmental efforts in the field of thermal-structural composites are summarized. These efforts are concerned, generally, with the application of composite systems as structural components, cooling systems, and environmental control systems. Specifically, investigations are in the areas of attachments for ablation systems, oxidation resistant coatings for refractory metals, foamed ceramic composites, plasma-arc sprayed coatings, and inorganic-organic material system development. (Author)

AD-438 520 Div. 14, 20
OTS price $12.50

Monsanto Research Corp., Dayton, Ohio.
INVESTIGATION OF FLUORO COMPOUNDS FOR THERMAL

In cooperation with Wisconsin U., Madison.

Descriptors: (*Wood, Structural properties), (*Storage, Wood), (*Structures, Wood), Mechanical properties, Loading (Mechanics), Stresses, Moisture, Moistureproofing, Deterioration, Standards, Plywood, Sandwich panels, Beams (Structural), Joints.

Efficient use of wood in storage buildings requires specialized knowledge of its directional strength properties, its response to long-time loading, its dimensional stability, insulating value, and resistance to fire and decay. Structural elements of wood or wood-base materials include sawn and round timbers, sheet materials, and a great variety of built-up or adhesive-bonded components. The high pressures on walls of storage structures and the moisture problems associated with the drying of stored materials require careful consideration in design. (Author)

AD-438 050 Div. 14, 4
OTS price $3.00

General Electric Co., Cincinnati, Ohio.
CARBONIZATION OF PLASTICS AND REFRACTORY MATERIAL RESEARCH. VOLUME II. REFRACTORY MATERIALS.
Rept. for 1 Jul 61-30 Jun 62,
by G. M. Kibler, T. F. Lyon, M. J. Linevsky and V. J. DeSantis. Mar 64, 181p.
Contract AF33 616 6841, Proj. 4776; ARPA Order 24 61
WADD TR60 646, pt. 3, vol 2
Unclassified report

Report on Materials Thermal Properties.

Descriptors: (*Refractory materials, Thermal properties), (*Thermal properties, Refractory materials), Vapor pressure, Emissivity, Absorption spectrum, Spectra (Infrared), Vaporization, Hafnium compounds, Zirconium compounds, Tantalum compounds, Nitrides, Thorium compounds, Oxides, Niobium compounds, Titanium compounds, Borides, Thermal properties, Refractory materials, Hafnium, Chemical analysis, X-ray diffraction analysis, Thermodynamics, Weight, Density, High temperature research.

Vapor pressure studies were conducted through the application of Langmuir evaporation, Knudsen effusion, matrix isolation and resonance line absorption techniques. The vaporization of hafnium and zirconium nitrides was studied by the Knudsen effusion method; the Langmuir evaporation method was applied to pure hafnium metal. Matrix isolation of vapor over thoria proved successful and structural assignments were made to various bands in the infrared absorption spectra of the matrix isolated species. Resonance line absorption photometry studies of TiB2 were completed. Normal spectral emissivity data from 0.4 to 5.0 microns and from 1500 to 2500 K, supported by systematic methods of material characterization, were obtained for the compounds niobium diboride, zirconium diboride, titanium diboride, tantalum nitride, hafnium nitride, and zirconium nitride. (Author)

AD-438 132 Div. 14, 20
OTS price $1.10

General Dynamics, Fort Worth, Tex.
MATERIALS - SOLID FILM LUBRICANTS - IRRADIATION BY THE GTR AND C060 SOURCES - EFFECTS ON WEAR-LIFE,
by J. W. Head. 15 Apr 64, 7p. Rept. no. FTDM 3006
Unclassified report

Descriptors: (*Lubricants, Films), (*Radiation damage, Lubricants), Research reactors, Wear resistance, Solids, Test methods, Test equipment, Gamma rays, Radioactive isotopes, Cobalt.

Data obtained from test races exposed to three different radiation doses are tabulated along with data on unirradiated specimens. No significant effects were produced on the wearlife of Electrofilm 66C, Alpha Molykote X-106, or GD/FW X-38 solid film lubricants after exposure to the irradiation conditions. (Author)

AD-438 136 Div. 14
OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - HRP - 3/8 OX AND 3/4 OX HEXCEL FOAM FILLED CORE - SHEAR STRENGTH AND SHEAR MODULUS - DETERMINATION OF,
by J. P. Thomas. 15 Apr 64, 10p. Rept. no. FTDM 3048
Unclassified report

Descriptors: (*Expanded plastics, Mechanical properties), (*Sandwich construction, Expanded plastics), Sandwich panels, Thermal insulation, Heat shields, Launch vehicles, Failure (Mechanics), Shear stresses.

AD-438 137 Div. 14, 20
OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIALS - CERAMIC BONDED SOLID FILM LUBRICANTS-EFFECTS OF IRRADIATION AND HIGH TEMPERATURE ON,
by J. W. Head. 15 Apr 64, 8p. Rept. no. FTDM 3053
Unclassified report

Descriptors: (*Lubricants, Films), (*Radiation damage, Lubricants), Ceramic materials, Wear resistance, Research reactors, Solids, Lead compounds, Molybdenum compounds, Sulfides, Boron compounds, Oxides, Barium compounds, Cobalt compounds, Calcium compounds, Fluorides, Graphite, Sodium compounds, Temperature, High temperature research, Friction, Silicates.

From wear life determinations conducted at 1000 F on a solid film lubricant composed of lead sulfied, molybdenum disulfide and boric oxide, there was no significant effect due to exposure to reactor radiation. From wear life determinations conducted on a solid film lubricant composed of molybdenum disulfide, graphite, and sodium silicate, there was no significant effect on the 600 and 1200 F wear life characteristics due to exposure to reactor radiation. (Author)

AD-438 141 Div. 14
OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVES - AEROBOND 500, DYNABOND 132 - CREEP RUPTURE - TEST OF,
by T. K. Spiker. 15 Apr 64, 9p. Rept. no. FTDM 3197
Unclassified report

Descriptors: (*Adhesives, Sandwich panels), (*Bonding, Sandwich panels), (*Sandwich panels, Adhesives), Stainless steel, Brazing, Creep, Rupture, Mechanical properties, Stresses, Beams (Structural).

Aerobond 500 beam specimens were not tested in creep. The first specimen bonded with Aerobond 500 blew apart during postcure at atmospheric

the gage length tested and the time under load. In considering the statistical distribution of fiber strengths more than one population of flaws has been detected. The amount of damage to the fibers in such handling as the making of roving is rather severe, judged by the size or length effect on the strength of filaments. On the other hand with good design this mechanical damage is not reflected in a correspondingly large size effect in the strength of pressure vessels. (Author)

AD-439 427 Div. 14, 12, 32
OTS price $12.00

Syracuse Univ., Research Inst., N. Y.
INFORMATION REQUIREMENTS FOR APPLICATION OF NON-METALLIC STRUCTURAL MATERIALS TO AEROSPACE VEHICLES.
Rept. for Nov 59-30 Jun 60,
by C. S. Grove, Jr. and R. Ford Pray, III.
Nov 60, 168p.
Contract AF18 600 1876, Proj. 7381, Task 73812
WADD TR60 446 Unclassified report

Report on Material Applications.

Descriptors: (*Materials, Documentation), (*Structures, Materials), (*Aerospace craft, Materials), Reviews, Indexes, Aircraft industries, Aerospace planes, Industries, Handbooks.

The purpose of this project was to survey the aerospace industry and agencies concerned with aerospace problems. This study was directed toward determining which materials, properties, and problem areas in nonmetallics exist now or will exist in the future and which methods can be used to placed evaluated data and information into the hands of the designer. This report presents results of the survey. It was determined that a Design Handbook or Manual on non-metallic materials will greatly benefit the aerospace field as a whole. Specific recommendation for such a handbook are presented in the report. (Author)

AD-439 445 Div. 14, 25, 4
OTS price $9.10

Lockheed Missiles and Space Co., Sunnyvale, Calif.
THERMODYNAMICS OF REFRACTORY COMPOUNDS OF BERYLLIUM (OXIDES, BORIDES, CARBIDES, AND NITRIDES): AN ANNOTATED BIBLIOGRAPHY,
Comp. by Jack B. Goldmann. Apr 63, 103p. SB 63 16; 3 80 63 3
Contract NOrd 17017
Unclassified report

Descriptors: (*Refractory materials, Beryllium compounds), (*Beryllium, Thermodynamics), (*Beryllium compounds, Thermodynamics), (*Ceramic materials, Thermodynamics), (*Bibliographies, Beryllium compounds), (*Thermodynamics, Bibliographies), Oxides, Carbides, Borides, Nitrides, High-temperature research, Abstracts.

The thermodynamics of beryllium and its refractory compounds (oxides, borides, carbides and nitrides) from 298.15 to 6000 K is the basis for this annotated bibliography. References consist of theoretical and experimental studies which appeared in print from 1880 to 1962. The resources of Lockheed Missiles and Space Company Technical Information Center were utilized in the preparation of this bibliography. (Author)

AD-439 449 Div. 14, 12, 9, 25
OTS price $6.60

Aeronca Mfg. Corp., Middletown, Ohio.
HEAT SHIELD CONCEPTS AND MATERIALS FOR REENTRY VEHICLES,
ed. by W. Niehaus. 15 Jul 63, 66p.
Contract AF33 657 7151
Unclassified report

Descriptors: (*Heat shields, Reentry vehicles), (*Thermal insulation, Materials), Composite materials, Ceramic materials, Foams, Porous materials, Honeycomb cores, Plastics, Metals, Ablation, Sweat cooling, Melting, Sublimation, Heat transfer, Thermal radiation, Thermal conduction, Thermal diffusion, Fluid flows, Pyrolysis, Heat sinks, Graphite, Aluminum compounds, Silicon compounds, Zirconium compounds, Oxides, Emissivity, Ceramic coatings, Trajectories, Atmosphere entry, Aerodynamic heating, Dissociation, Refractory metals, Heat resistant metals and alloys.

The purpose of this paper is to discuss thermal protection systems and the Thermantic Structure developed by Aeronca Manufacturing Corporation, to withstand temperatures in excess of 3000 F for extended periods of time (approximately one hour) and to resist severe noise and dynamic loads associated with space vehicle flight. The heat shield, made of a low density ceramic foam reinforced with a honeycomb cell structure, is capable of maintaining an internal temperature suitable for the survival of both man and sensitive equipment. The thermantic structure uses a conventional load bearing panel fabricated from alloy sheets brazed to stainless steel honeycomb and this panel brazed to the ceramic honeycomb reinforcement. This ''Astroshield'' concept offers the combined advantages of high temperature resistance, lightweight, thermal shock resistance, chemical stability and high strength. (Author)

AD-439 491 Div. 14, 31
OTS price $7.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
SUITABILITY OF MIL-P-23653 MATERIAL FOR DAMPING MECHANICAL VIBRATIONS IN LIGHT STEEL PLATING,
by R. R. James. 12 May 64, 71p.
Proj. S F013 13 01, Task 908
MINS.94 52 Unclassified report

Descriptors: (*Acoustic insulation, Metal plates), (*Mechanical waves, Damping), Vibration, Submarines, Submarine noise, Vinyl plastics, Epoxy plastics, Shock resistance, Adhesion, Stability, Compressive properties, Steel, Plastics, Sheets, Bonding, Adhesives, Composite materials, Laminates, Laminated plastics.

The suitability of the damping material described in Specification MIL-P-23653 for application to light steel plates in ballast tanks and superstructure areas of submarines was investigated. The principal findings were: (1) damping efficiency of both constrained and unconstrained treatments on 3/8-in. -thick plates over the frequency range of 50 to 1,500 c is very good with best average damping being obtained at 55 and 75 F, (2) the tiles of damping material must be constrained to prevent possible detachment by mechanical shock. The studs on which the constrained treatment is secured should be 3/8-in. diameter minimum and the studs should be so spaced that at least one stud will be located in each title, (3) the damping treatment should be bonded to the steel plate but not to the constraining layer, (4) the interface between the constraining layer and the damping material must be lubricated for best damping efficiency, and (5) the damping material must have low permanent compressibility

PROTECTION.
Final summary rept., 19 Apr 61-18 Apr 63,
by J. M. Butler and L. E. Erbaugh. 18 Apr 63,
171p.
Contract DA19 129qm1773, Proj. 7X12 01 002
Unclassified report

Descriptors: (*Nuclear explosions, Thermal radiation), (*Halocarbon plastics, Thermal insulation), Polyvinyl chloride, Polyethylene plastics, Fluorine compounds, Chlorine compounds, Degradation, Reaction kinetics, Thermochemistry, Pigments, Oxides, Chromium compounds, Aluminum compounds, Iron compounds, Zinc compounds, Acrylic resins, Smoke, Attenuation, Radiation injuries, Vinyl plastics.

The thermal degradation of halo-polymers was studied in relationship to two possible processes of thermal protection. The first is based on absorption of energy by endothermic decomposition of the polymer and the second is based on attenuation of incident radiation by smoke or fog formed by thermal decomposition of the polymer. The kinetics and energetics of the thermal degradation of various polymers were investigated by thermogravimetric analysis and differential thermal analysis. From these studies and from thermochemical calculations, it was concluded that energy absorption by endothermic decomposition is not a major factor in the thermal protection afforded by these polymers, nor does endothermic decomposition account for the differences in thermal protection shown by the different polymers. (Author)

AD-438 545 Div. 14, 25
OTS price $1.10

Polymer Research Inst., Univ. of Mass., Amherst.
A STUDY OF DYNAMIC BIREFRINGENCE IN POLYMERIC SOLIDS,
Final rept.,
by Richard S. Stein. 4 Nov 63, 3p.
Grant AFOSR61 28
AFOSR J1365 Unclassified report

Descriptors: (*Polymers, Refractive index), (*Refraction, Deformation), Crystal structure, Elasticity, Strain (Mechanics), Polyethylene plastics, Alkenes.

AD-438 781 Div. 14
OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - DYNABOND 132 - ADDITIONAL TESTING AND DISPOSITION OF SPECIMENS REMAINING FROM 420 F CREEP TEST (50-2895),
by I. K. Spiker. 28 Feb 64, 17p. Rept. no. FGT3093
Unclassified report

Descriptors: (*Sandwich panels, Bonding), (*Adhesives, Sandwich panels), Honeycomb cores, Stainless steel, Plastics, Laminated plastics, Glass textiles, Creep, Shear stresses, Beams (Structural), Salt spray tests, Humidity, Deflection, Environmental tests, High-temperature research, Time, Experimental data.

Creep results on Dynabond 132 bonded panels reported herein are not conclusive, because the annealed stainless steel skins were loaded very close to their yield point. Dynabond 132 bonded sandwich panels will produce core shear failure of annealed and heat treated (Condition TH1050) 3-15 NP, PH15-7Mo honeycomb core at 420 F. At 500 F, core shear failure is produced in the annealed core, but not in the heat treated core. Exposure to salt spray, and humidity for 30 days had no detrimental effect in the bond and no penetration of salt or moisture was found in any of the interior cells of the sandwich panels. (Annealed stainless steel skin-GRP core specimens, exposed to humidity, are an exception to this general conclusion. Previous creep testing of the panel from which the specimens were cut or the cutting technique, may have partially caused the low flatwise tension values.) (Author)

AD-438 844 Div. 14, 17
OTS price $2.60

Space Sciences Lab., General Electric Co., Philaselphia, Pa.
INVESTIGATION OF BONDING IN OXIDE-FIBER (WHISKER) REINFORCED METALS.
Quarterly rept. no. 6, 1 Oct-31 Dec 63,
by Willard H. Sutton. Dec 63, 29p.
Contract DA36 0430RD3768Z, Department of the Army Proj. 1HO 24401A11
AMRA TR CR63 01 6 Unclassified report

Descriptors: (*Composite materials, Bonding), (*Ceramic fibers, Reinforcing materials), (*Reinforcing materials, Ceramic fibers), Aluminum compounds, Oxides, Nickel, Nickel alloys, Aluminum alloys, Chromium alloys, Copper alloys, Indium alloys, Titanium alloys, Zirconium alloys, Additives, Surface active substances, Drops, Adhesion, Liquid metals, High-temperature research, Low pressure research, Solids, Liquids, Melting, Impurities.

Sessile drop experiments were conducted on two types of nickel (impurity levels of 16ppm and 31 ppm) and alpha-Al2O3. Contact angles were measured for both types and were consistently higher by about 12 degrees for the purer specimens. Experiments were also conducted using graphite furnace parts in an attempt to provide a more reducing atmosphere. No changes were noted in the equlibrium contact angles, although a dull thin surface film formed on all nickel specimens. The interfacial reactions between the Ni-alpha-Al2O3 were examined using an optical microscope. A procedure for preparing specimens for determining the interfacial shear strengths is also discussed. (Author)

AD-439 217 Div. 14
OTS price $0.50

Naval Research Lab., Washington, D. C.
THE STRENGTH OF GLASS FIBERS AND THE FAILURE OF FILAMENT WOUND PRESSURE VESSELS,
by J. A. Kies. 28 Feb 64, 20p.
NRL 6034 Unclassified report

Descriptors: (*Glass textiles, Tensile properties), (*Filament wound construction, Pressure vessels), (*Rocket motor cases, Filament wound construction), Elasticity, Density, Oxides, Aluminum compounds, Calcium compounds, Magnesium compounds, Boron compounds, Dioxides, Silicon compounds, Stresses, Rupture, Reinforcing materials, Plastics, Failure (Mechanics), Guided missiles (Underwater-to-surface), Guided missiles (Surface-to-surface).

In glass-reinforced-plastic rockets such as Polaris A3 and third stage Minuteman, the current strength/weight advantage over metals has been achieved in a major degree by utilizing a new glass designated S or S-994. Examination of what is meant by the strength of glass filaments has led to a new method of characterizing the strength, especially for the purpose of exploring new glasses. Since the tensile strength is influenced by flaws and by environmental effects, the strength is therfore strongly dependent on

Descriptors: (*Lubrication, Space environmental conditions), (*Lubricants, Research program administration), Spacecraft, Low pressure research, Sampling, Tables, Gas bearings, Antiseize compounds, Vacuum, Scientific research.

In studying the field of lubrication as related to operation of equipment at extreme altitudes and in space, the Lubricants Group, which is advisory to this office, concluded that progress in this field would be aided by better interchange of information. The Group accordingly prepared a questionnaire which was circulated in the Spring of 1961 to those believed to be working in this field. The objective of that questionnaire was to develop a listing of research workers and organizations interested in the field of aerospace lubrication and the general nature of their programs. A resume of the information so elicited was circulated in August 1961 under the title of ''Aerospace Lubrication Survey''. (Author)

AD-439 696 Div. 14, 4
OTS price $3.60

Thiokol Chemical Corp., Trenton, N. J.
NITROSO RUBBER RESEARCH, DEVELOPMENT AND PRODUCTION.
Quarterly rept., 1 Sep-30 Nov 63,
by Marvin M. Fein, Murray S. Cohen, David J. Mann and Morris B. Berenbaum. 30 Nov 63, 37p.
Rept. no. RD3430 3
Contract DA19 129AMC69X, Proj. 7X93 15 004
Unclassified report

Descriptors: (*Fluorine compounds, Synthesis (Chemistry)), (*Halocarbon plastics, Production), (*Synthetic rubber, Production), Organic nitrogen compounds, Acetates, Copolymerization, Viscosity, Vulcanization, Anhydrides, Succinates, Anilines, Aromatic compounds, Nitrates, Benzoic acids, Nitrites, Nitrobenzenes, Halogenated hydrocarbons, Oxygen compounds, Esters, Oxygen compounds, Nitrogen compounds.

Additional safety testing of the trifluoroacetyl nitrite indicate that the process developed for CF3NO production can be operated without undue hazard. Successful purification of CF3NO has been achieved through the use of water and 5% caustic scrubbers followed by a cold (-80 to -100 C) molecular sieve column to remove the last trace of impurities. Approximately 30 g of pentafluoronitrosobenzene has been prepared. CF3NO/C2F4 copolymers were prepared with intrinsic viscosities of 0.70. (Author)

15. MATHEMATICS

AD-437 920 Div. 15, 25
OTS price $4.60

North Carolina State Coll., Raleigh, School of Physical Sciences and Applied Mathematics.
NUMERICAL TREATMENT OF AN INTEGRAL EQUATION ARISING IN A MIXED-BOUNDARY ELASTICITY PROBLEM,
by John T. Welch, Jr. 28 Apr 64, 48p.
Grant AFOSR444 63
Unclassified report

Doctoral thesis.

Descriptors: (*Boundary value problem, Elasticity), (*Integral equations, Numerical analysis), (*Cylindrical bodies, Stresses), Tensile properties, Integral transforms, Fourier analysis, Tables, Fracture (Mechanics), Pressure.

The non-singular Fredholm integral equation is solved numerically. The equation has been derived by Sneddon and Collins in the analytical treatment of the stress field in a long cylinder containing a penny-shaped crack being opened by an arbitrary axially symmetric pressure. In the discussion of the numerical treatment, emphasis is on techniques which allow the treatment of additional cases, without excessive recomputation. Results are given for constant, parabolic, and step pressures across the crack, with variations in crack width and Poisson's ratio. The shape of the crack is also obtained in many cases. (Author)

AD-437 983 Div. 15
OTS price $1.60

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
ON A CLASS OF TESTING PROCEDURES IN LINEAR MODELS,
by Madan L. Puri. Mar 64, 14p. Rept. no. IMM NYU321
Contract Nonr28538
Unclassified report

Descriptors: (*Linear systems, Statistical tests), Statistical distributions, Probability, Analysis of variance, Sampling.

Independent samples from the populations with continuous cumulative distribution functions are given. For testing the null hypothesis, a class of test statistics based on the ranks of the observations are proposed and their limiting distributions are derived. These results are used to obtain the asymptotic relative efficiencies (in the Pitman sense) with respect to one another and to the normal theory competitor. (Author)

AD-437 998 Div. 15
OTS price $5.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
MODAL AND MANY - VALUED LOGICS,
by Erwin Biser. Feb 64, 57p.
Task 1 G6 20801A037 02
AELRDL TR2435 Unclassified report

Descriptors: (*Mathematical logic, Bionics), Set theory, Bionics, Operators (Mathematics), Matrix algebra, Nerve networks, Metamathematics, Switching circuits.

This report presents several postulate-sets and theorems for many-valued logics, logics characterized by more than two truth-values. It also presents basic axiom-sets and theorems for modal logics including that of strict implication. The matrix formulation of strict implication has been utilized recently in the representation of neural nets. The report exhibits some of the paradoxes of strict implication and their analogues of material implication in the sentential calculus of A. N. Whitehead and B. A. Russell. The many-valued logics of J. Lukasiewicz, A. Tarski, and E. L. Post are treated in some detail. Finally, the report deals with the four-valued Post logic and the application of three-valued Post logic to switching and gate functions. (Author)

AD-437 999 Div. 15
OTS price $1.60

Range Instrumentation Systems Office, White Sands Missile Range, N. Mex.
GRAVITATIONAL SMOOTHING,
by Robert E. Green. Feb 64, 14p.
DA Proj. 1E250206D241
RISO TM0930 2 Unclassified report

under deep submergence pressures in order to prevent loosening of constraining layers in service (Author)

AD-439 492 Div. 14
OTS price $1.60

Southern Research Inst., Birmingham, Ala.
THE DEVELOPMENT AND EVALUATION OF HEAT-RESISTANT, RAIN-EROSION-RESISTANT COATINGS.
Bimonthly progress rept. 4, 26 Dec 63-26 Feb 64, by R. B. Perkins. 16 Apr 64, 15p.
Contract N156 43450
Unclassified report

Descriptors: (*Antirain agents, Plastic coatings), (*Heat-resistant plastics, Plastic coatings), (*Plastic coatings, Metals), Aluminum, Metals, Halocarbon plastics, Adhesion, Silicon compounds, Nitrogen compounds, Polymers, Varnishes, Stability, Abrasives.

It was demonstrated that different lots of Viton A differ in the rate of curing but that all lots evaluated produce coatings of substantially equal properties if the coatings are cured for at least 30 days. Pyre-ML (pyromellitimide polymer) coatings were found unsatisfactory as rain-erosion-resistant coatings because of low abrasion resistance. One silicon-nitrogen polymer coating was evaluated and the preliminary findings encourage a further study of this type of polymer. A survey of the literature on heat-resistant polymers indicated several types of polymers of interest in the investigation for rain-erosion-resistant coatings. (Author)

AD-439 599 Div. 14, 26
OTS price $9.10

Institute of Engineering Research, Univ. of California, Berkeley.
A FUNDAMENTAL STUDY OF THE VARIABLES ASSOCIATED WITH THE MIXING OF CERAMIC RAW MATERIALS.
Rept. for July 62-Jan 64, by D. W. Fuerstenau, R. M. Fulrath and J. A. Pask. Mar 64, 107p.
Contract AF33 616 7763, Proj. 7350, Task 735001
ASD TDR62 732, pt. 2 Unclassified report

Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: (*Ceramic materials, Processing), (*Powders, Mixtures), Aluminum compounds, Calcium compounds, Oxides, Sintering, Spinels, Particles, Surface properties, Particle size, Mechanical properties, X-ray diffraction analysis.

This investigation has shown how the amount of spinel formed by sintering alumina and magnesia powders can be used as a measure of the degree of mixing, as a model system in ceramic processing. The dry mixing of fine powders in model mixers of the barrel and V types has been conducted to study various mixing mechanisms. Analysis of these data, aided by studies of the mixing of macroscopic particles, revealed the role played by the differences in density between the components of the mix. An X-ray technique was devised to examine the micromixing of fine powders in relation to the sintering of ceramic bodies. The role of electrical effects at solid-liquid interfaces in determining mutual interaction of particles in wet mixing phenomena has been examined. (Author)

AD-439 601 Div. 14
OTS price $1.60

Naval Research Lab., Washington, D. C.
MATERIAL IDENTIFICATION (SORTING).
by Irwin Vigness. May 64, 13p.
Proj. SR007 10 04, Task 891
Unclassified report

Descriptors: (*Materials, Identification), (*Identification, Test methods), Non-destructive testing, Inductance, Electrical properties, Ultrasonic radiation, Thermal conductivity, Thermoelectricity, Hardness, Stresses, Strain (Mechanics), Magnetic properties, Chemical properties, Abrasives, Density, Static electricity.

A great variety of techniques are available for the sorting of materials. Some of these techniques have been extensively developed for other purposes, but can be adopted for sorting purposes with relatively small amounts of research and development effort. This is particularly true of eddy-current and ultrasonic methods where much equipment is readily available. More straightforward methods involving more convenient equipment, such as dial-reading portable hardness testers, can be quickly adopted for appropriate situations. Older shop methods such as spark testing require up dating to extend their usage to new materials. No single source of literature exists that reviews critically, and describes extensively, what information exists in the field of sorting. An authoritative review would be welcome. (Author)

AD-439 620 Div. 14, 25
OTS price $1.10

Firestone Flight Sciences Lab., Calif. Inst. of Tech., Pasadena.
A METHOD OF DYNAMIC FRINGE PREDICTION IN BIREFRINGENT VISCOELASTIC MATERIALS.
by R. J. Arenz. Mar 63, 10p. Rept. no. GALCIT SM63 25
Contract AF29 601 5367
Unclassified report

Descriptors: (*Materials, Viscoelasticity), (*Photoelasticity, Test methods), Optical phenomena, Stresses, Strain (Mechanics), Refraction, Mechanical properties, Optical properties, Mechanical waves, Propagation, Relaxation time, Shear stresses, Transformations (Mathematics), Operators (Mathematics), Creep, Mathematical analysis.

Current research is directed toward a general verification of the validity of the use of linear viscoelastic materials in dynamic photoelastic testing. For the complete analysis of a two-dimensional stress field by dynamic photoviscoelasticity, the questions of time-dependent optical axis orientation and the determination of the necessary third piece of information (such as thickness change) must be considered; however, the crucial initial concern is to establish a quantitatively valid method to account for the time-dependent mechanical and optical properties characterizing viscoelastic materials. Hence, a situation that can be easily treated is a simple one-dimensional rod subjected to a step compression stress impact on the end. The verification will consist in comparing the theoretically predicted time-dependent fringe pattern with the experimental results for the same geometry and loading. (Author)

AD-439 678 Div. 14, 12
OTS price $3.60

Office of the Director of Defense Research and Engineering, Washington, D. C.
AEROSPACE LUBRICATION RESEARCH SURVEY.
Dec 62, 31p.
ODDRE FL210 48 Unclassified report

include the calculus of variations, the method of steepest descent, and dynamic programming. A derivation of the theory of each technique is included to show where and why the major numerical difficulties arise. The procedures employed to overcome these difficulties are discussed in detail. The primary advantages afforded by each of the three techniques are also discussed and compared; conclusions are drawn as to which technique will generally be the most satisfactory under varying circumstances. (Author)

AD-439 011 Div. 15
OTS price $1.60

Midwest Research Inst., Kansas City, Mo.
EXPANSIONS OF SPHEROIDAL WAVE FUNCTIONS,
by Yudell L. Luke. 1 June 62, 16p.
Contract Nonr263800X, MRI Proj. 2229P
Unclassified report

Descriptors: (*Wave functions, Theory), Perturbation theory, Polynomials, Taylors series.

AD-439 012 Div. 15
OTS price $2.60

Midwest Research Inst., Kansas City, Mo.
ECONOMIZATION OF INTEGRALS OF TRANSCENDENTAL FUNCTIONS.
Technical rept.,
by Yudell L. Luke. 15 Mar 61, rev. 1 June 62, 23p.
Contract Nonr2638 00X, MRI Proj. 2229P
Unclassified report

Descriptors: (*Transcendental functions, Integrals), Economics.

AD-439 017 Div. 15
OTS price $6.60

Midwest Research Inst., Kansas City, Mo.
RATIONAL APPROXIMATIONS FOR THE INCOMPLETE GAMMA FUNCTION.
Summary rept., 31 July 61-31 July 62,
by Yudell L. Luke. 15 Aug 62, 62p.
Contract Nonr263800X, MRI Proj. 2229P
Unclassified report

Descriptors: (*Integrals, Functions), Polynomials, Tables, Programming (Computers).

AD-439 025 Div. 15
OTS price 1.60

Center For Naval Analyses, Washington, D. C.
THE DIRECTIONAL DERIVATIVE OF PHI(x)=Min y F(x,y)
by J. Bram. 12 Feb 64, 12p.
CNA RC 2 Unclassified report

Descriptors: (*Game theory, Functions), (*Algebraic topology, Convex sets), Nonlinear programming.

AD-439 076 Div. 15
OTS price $1.10

Innsbruck Univ. (Austria).
APPLICATION OF SPINOR METHODS TO RIEMANNIAN MANIFOLDS.
Quarterly technical status rept. no. 2,
1 Dec 63-29 Feb 64,
by F. Cap. 29 Feb 64, 8p.
Contract DA91 591EUC2947
Unclassified report

Descriptors: (*Algebraic topology, Transformations (Mathematics)), Relativity theory, Groups (Mathematics).

The fundamental problem may be stated as follows: what possibilities basically exist at all of finding for any desired nonsingular transformation in Riemannian space a corresponding spin transformation. In general this does not seem to be the case, since there are no spinor representations of the full Riemannian transformation groups. Hence, within Riemannian geometry there exist two possibilities only: (1) That of attributing spin transformations to only a part of the full Riemannian transformation group, (2) Putting the Spin transformation S-1, which however would have the consequence that there no longer exists a spinor in the proper sense of the general theory of relativity. The problem of maintaining the spinor concept within the general theory of relativity is taken up extending it to cover the Lorentz case. (Author)

AD-439 258 Div. 15
OTS price $2.60

Educational Testing Service Princeton, N. J.
SOME GENERALIZATIONS OF A THEORETICAL DISTRIBUTION OF MENTAL TEST SCORES,
by John A. Keats. Sep 63, 29p. Rept. no. RB63 25
Contract Nonr2752 00, Proj. NR151 201
Unclassified report

Descriptors: (*Mathematical analysis, Tests), Distribution, Theory, Model theory, Errors.

The negative hypergeometric distribution may be generalized to provide distributions involving 3, 4 or more parameters. It is shown that, in the case of the binomial error model, such distributions correspond to quadratic, cubic, etc., regressions of true scores on raw scores. Explicit formulas are given for the bivariate moments required to fit these regressions and so estimate the parameters of the generalized hypergeometric distribution. Equations are also developed for fitting the 3 and 4 parameter distributions directly, i.e, without reference to the model, and the method for generalizing these is indicated. The methods developed are applied to objective test data with satisfactory results. (Author)

AD-439 259 Div. 15
OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
NON-PARAMETRIC MAXIMUM LIKELIHOOD ESTIMATION,
by G. B. Crawford and S. C. Saunders. Oct 63, 21p. Mathematical note no. 326; Rept. no. D1 82 0308
Unclassified report

Also available from author.

Descriptors: (*Statistical functions, Topology), (*Topology, Statistical distributions), Set theory.

Given that a distribution function is a member of a subclass of absolutely continuous measures, the problem of nonparametric estimation is considered, with the method of maximum likelihood, of the underlying density function of a given sample of independent identically distributed random variables. Sufficient conditions on the space of probability densities and its topology are given for the consistency of such an estimate. (Author)

AD-439 262 Div. 15
OTS price $2.60

Naval Postgraduate School, Monterey, Calif.
OPTIMIZING FOR MINIMUM RESPONSE TIME IN A

Descriptors: (*Range finding, Least squares method), (*Acceleration, Range finding), Polynomials, Numerical analysis, Gravity, Tracking, Doppler radar, Vector analysis.

A method of using the acceleration due to gravity to improve range and range rate measurements by the method of least squares is presented. A method of determining radial acceleration from the calculation of gravitational acceleration is included. Some of the limitations of the gravitational smoothing technique are enumerated. (Author)

AD-438 433 Div. 15
OTS price $2.60

Rand Corp., Santa Monica, Calif.
ON SET FUNCTIONALS THAT PRESERVE A GIVEN GEOMETRY CLASS,
by Dominic G. B. Edelen. Apr 64, 26p. Memo no. RM 4022 PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Geometry, Algebras), (*Mapping (Transformations), Set theory), Functional analysis, Functions.

A geometry class is defined as the collection of all geometric objects of a given order with a given law of transformation. A basic functional equation is obtained for an element a which is both necessary and sufficient for it to be an element of the same geometry class as the given element. After establishing a general representation theorem for elements of an arbitrary linear homogeneous geometry class, explicit solutions of the basic functional equation are obtained for elements of this class. (Author)

AD-438 439 Div. 15
OTS price $4.60

RAND Corp., Santa Monica, Calif.
SOME THEOREMS ON FUNCTIONALS OF MARKOV CHAINS,
by Sidney C. Port. Apr 64, 41p. Memo. no. RM3985 PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Statistical processes, Sequential analysis), (*Probability, Stochastic processes), Functional analysis, Stochastic processes, Operators (Mathematics), Set theory.

Various phenomena associated with a Markov process in discrete time are investigated. Attention is focused on recurrent events (i.e., to successive entrances into some fixed state of a Markov chain with the positive integers as states). Working time distribution is completely determined by the sequence (EY sub n), where Y sub n is the time, as observed from n, that the event last took place. Criteria for the event to be persistnet, transient, positive, etc., may be given directly in terms of the EY sub n. A particular class of null events called beta-regular is examined and various joint-limit distributions are found for some of the functionals usually associated with these events. These limit laws are extended to situations more general than recurrent events, and these extended results are then applied to several concrete situations. (Author)

AD-438 546 Div. 15
OTS price $3.60

Princeton Univ., N. J.
OBSTRUCTIONS TO IMPOSING DIFFERENTIABLE STRUCTURES,
by James Nunkres. 1963, 38p.
Contract AF49 638 431
AFOSR TN60 921 Unclassified report

Descriptors: (*Topology, Integrals), Mapping (Transformations), Series, Algebraic topology, Groups (Mathematics).

Previously developed techniques are applied to this problem. Roughly, a Brouwer triangulation of topological n-manifold, M, is assumed and imbeddings are taken as a first try at coordinate systems covering M. These do not overlap differentiably, but an attempt is made to ''smooth them out'' so that they will. Obstructions to this smoothing are encountered, which appear in the infinite homology, with twisted coefficients in the non-orientable case. In special cases (e.g. if M is contractible) all these homology groups vanish, and the techniques suffice to construct a differentiable structure on M. A list of such cases is given. To strengthen the conclusion of the problem, the differentiable structure obtained should be compatible with the given triangulation, or some subdivision of it. The differentiable structures constructed do not have this property, for they may possess conical points. The differentiable structures obtained may be modified so as to satisfy the compatibility conditions, but it remains to be seen whether this is more than a guess. The results of R. Thom, who has also constructed an obstruction theory to attack this problem, are said to be stronger than those which appear in the present paper. (Author)

AD-438 855 Div. 15
OTS price $6.60

David Taylor Model Basin, Washington, D. C.
ANALYSIS OF WAKE SURVEY OF SHIP MODELS COMPUTER PROGRAM AML PROBLEM NO. 840-219F,
by Henry M. Cheng. Mar 64, 68p.
Proj. S R011 01 01
DTMB 1804 Unclassified report

Descriptors: (*Wake, Programming (Computers)), (*Ships, Wake), Numerical methods and procedures, Hydrodynamics.

This report presents a brief discussion of the computer program written for the purpose of analyzing experimental wake survey data. The method used in computation is briefly discussed and a detailed instruction for preparation of input data is provided. Samples of computer input and output are included. (Author)

AD-438 980 Div. 15
OTS price $12.50

Douglas Aircraft Co., Inc., Santa Monica, Calif.
A STUDY OF OPTIMIZATION TECHNIQUES,
by Jerry L. Horsewood. Jan 64, 178p. Rept. no. SM 45811
Unclassified report

Master's thesis.

Descriptors: (*Optimization, Flight paths), (*Calculus of variations, Trajectories), (*Dynamic programming, Trajectories), (*Trajectories, Optimization), Descent trajectories, Numerical methods and procedures, Motion, Mapping, Control systems, Decision making, Partial differential equations.

The analytic and numerical aspects of the application of three optimization techniques to a general problem in flight mechanics are investigated and compared. The three techniques

16. MEDICAL SCIENCES

AD-437 923 Div. 16, 28
OTS price $4.60

Human Engineering Labs., Aberdeen Proving Ground, Md.
THE HUMAN THERMAL ENVIRONMENT IN A WET TROPICAL AREA (OPERATION SWAMP FOX II),
by Arthur A. Woodward, Jr. Jan 64, 41p.
HEL TM1 64 Unclassified report

Descriptors: (*Hot environment, Stress (Physiology)), (*Military personnel, Hot environment), (*Performance (Human), Hot environment), Behavior, Tropical regions, Rainfall, Panama, Body temperature, Atmospheric temperature, Humidity, Atmospheric motion, Solar radiation, Experimental data, Periodic variations, Physiology.

During Operation SWAMP FOX II observations were made on the human thermal environment during tehe tropical rainy season in Panama. This report gives hourly measurements, for 43 consecutive days, for air temperature, humidity, air movement, solar radiation, and WBGT Index. The results show the importance of knowing hourly variations in environmental variables in assessing the severity of the thermal environment to men. Conditions severe enough to affect human performance adversely occurred only during the four middle hours of the day. The results indicate the primary importance of solar radiation in determining whether the thermal environment will become stressful to humans. The inadequacies of standard meteorological data for estimation of human thermal stress are discussed. (Author)

AD-437 929 Div. 16
OTS price $1.60

Maryland Univ., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE, VOLUME III, NO. 5,
ed. by George Anastos. 1964, 19p.
Contract DA49 193MD2238
Unclassified report

Descriptors: (*Arthropods, Bibliographies), (*Public health, Disease vectors), USSR, China, Ticks, Epidemiology, Mites, Diptera, Siphonaptera, Rodents, Lice, Hemiptera, Rickettsia, Protozoa, Diseases, Viruses.

AD-437 930 Div. 16
OTS price $1.60

Washington School of Psychiatry, D. C.
MATURATION OF ELECTROENCEPHALOGRAPHIC EVOKED POTENTIALS.
Final rept., 31 Oct 62-31 Oct 63,
by Ann B. Barnet. 31 Oct 63, 18p.
Grant DA MD193 62G51
Unclassified report

Descriptors: (*Electroencephalography, Infants), (*Sleep, Electroencephalography), Aging, Behavior, Reaction (Psychology), Children, Digital computers, Stimulation, Auditory perception, Brain.

Studies of the electrical responsiveness of the brain of the infant and child have been made to correlate the development of evoked EEG responses to lights and sounds with other aspects of maturation. The average evoked response to repetitive stimuli was determined by a general purpose digital computer using an averaging program. The evoked potential to auditory stimuli was studied in a group of normal sleeping newborns. The evoked response, present in all babies studied, decreases in amplitude as intensity of stimulation is attenuated and increases in amplitude as intensity increases. A response usually can be detected within about 25 decibels of normal adult waking threshold. The EEG records were graded as to stage of sleep. Latency of the average response increases in deeper sleep but the wave form does not appear to be influenced by sleep stage. With increase in age, the onset latency of the evoked response decreases, most of which takes place in the first months of life. The wave form of the response also becomes more influenced by the state of consciousness. (Author)

AD-437 987 Div. 16
OTS price $1.10

Walter Reed Army Medical Center, Washington, D. C.
FOAM MANDIBULAR SPLINT.
Rept. for Feb-Mar 64,
by James T. Hill and D. R. Ingenito. Apr 64, 10p.
Proj. 3A012501A82 03
WRAMC TR6401 Unclassified report

Descriptors: (*Prosthetics, Mouth), (*Dentistry, Surgical techniques), Fractures (Bone), Materials, Polymers, Foams, Effectiveness.

Under combat conditions the injury to the mandible is often complicated by tissue damage, both internally and externally. Nausea often leads to vomiting which is further aggravated by transportation over rough terrain. Under such conditions it is imperative that the patient be able to remove his bandage rapidly vomit, and replace the bandage afterwards. For this reason, an investigation of methods of immobilization of the mandible was conducted. As a result of this investigation a foam-in-place splint kit with quick release features was developed. (Author)

AD-438 047 Div. 16
OTS price $1.25

Aerospace Medical Research Lab. (6570th), Wright-Patterson AFB, Ohio.
AEROSPACE ENVIRONMENT SIMULATOR.
Rept. for Nov 57-Mar 62,
by Otto Schueller and Fred W. Berner. Feb 64, 39p.
AMRL TDR64 6 Unclassified report

Descriptors: (*Space environmental conditions, Models (Simulations)), (*Models (Simulations), Space environmental conditions), (*Manned spacecraft, Models (Simulations)), Design, Test facilities, Thermal radiation, Altitude chambers, Stress (Physiology), Space medicine, Cosmic rays, Infrared radiation, Solar radiation, Training, Instrumentation, Pressure breathing, Medical equipment, Monitors.

A critical requirement exists for a special Aerospace Environment Simulator, complementary to other USAF test and research facilities, for studying problems of personal protection in the vacuum and thermal radiation environments of space; for indoctrination and training of astronauts in personal protective equipment, and for biomedical and ecological research related to survival of man outside the atmosphere of the earth. Existing physiological altitude test chambers, large aerospace systems environmental chambers, and balloon and orbiting laboratories are either inadequate for this purpose or too hazardous and uneconomical. This report presents

Division 15 - MATHEMATICS

LINEAR SYSTEM WITH LIMITED CONTROL EFFORT,
by James S. Demetry and Harold A. Titus.
Apr 64, 23p.
NPS RP45 Unclassified report

Descriptors: (*Control systems, Optimization), Time-lag theory, Design, Linear systems, Costs, Integrals.

Integral indices of performance are brought to bear on the problem of minimizing step response time in some simple control systems. This minimization is subject to a bound on the total control effort that may be expended in response to a step command. Special attention is given to an index whose integrand is a form of the Euclidean norm of the system's states. An example is given showing, for a given system, the development of a weighting scheme for the second term in a two-term index of performance. (Author)

AD-439 265 Div. 15, 14
OTS price $1.60

Brown Univ., Providence R. I., Div. of Applied Mathematics.
A NOTE ON THE MECHANICAL CONSTITUTIVE EQUATIONS FOR MATERIALS WITH MEMORY,
by R. S. Rivlin. Mar 64, 12p. Rept. no. TR91
Contract Nonr56210, Proj. NR064 406
Unclassified report

Descriptors: (*Materials, Memory), (*Deformation, Theory), Equations, Stresses, Transformations (Mathematics), Mechanical properties.

This note is concerned with restrictions on the mechanical constitutive equations for a material with memory due to the fact that simultaneous rotation of the body and reference system leaves the stress unaltered. Two earlier methods of obtaining these restrictions are unified. (Author)

AD-439 424 Div. 15, 25
OTS price $1.60

Rochester Univ., N. Y.
SOME SOLVABLE POTENTIALS FOR THE SCHRODINGER EQUATION,
by H. H. Aly and R. M. Spector. 13 Mar 64, 11p.
Rept. no. UR875 25
Grant AF AFOSR439 63
Unclassified report

Descriptors: (*Differential equations, Quantum mechanics), Potential theory, Transformations (Mathematics).

Utilizing the modified Mathieu differential equation and Darboux's theorem for second order differential equations, some solvable potentials for the Schrodinger equation are constructed. The limitations of the potentials constructed by the use of Darboux's theorem are pointed out and discussed. (Author)

function following circumscribed cerebral lesions and stimulation in the monkey is reported. Previous research has shown that changes in visual capacity following striate cortex lesions in the monkey are not absoluts. When assessed by a perimetry device, the defective regions of the visual fields still permit a response to brief, dim flashes of light, although with decreased efficiency. Acuity measurements indicate a drop in acutiy less than that predictable from the supposed distance of the edge of the field defect from the fovea. It is suggested that the residual capacity is simply the integral of the types of responses found from retinal ganglion cells. Memory changes were analyzed in terms of a distinction between short-term and long-term processes. (Author)

AD-438 395 Div. 16
OTS price $1.10

Karolinska Inst., Stockholm (Sweden).
DISTRIBUTION OF BIOLOGICALLY ACTIVE COMPOUNDS IN THE BODY.
Final rept.
Apr 64, 5p.
Grant AF EOAR62 14
AFOSR 64 0841 Unclassified report

Descriptors: (*Phenols, Amines), (*Amines, Phenols), Adrenal glands, Nerves, Cells, (Biology), Nerve cells, Vasoactive agents, Acidosis, Respiratory system, Tracer studies, Nucleotides.

AD-438 458 Div. 16
OTS price $1.10

Tokyo Municipal Komagome Hospital (Japan).
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS.
Quarterly rept. no. 1, 1 Feb-30 Apr 62,
by Kazumine Kobari. 30 Apr 62, 4p.
Contract DA92 557FEC34616
Unclassified report

Descriptors: (*Infectious diseases, Gastrointestinal system), (*Dysentery, Pathology), Histology, Ulcers, Edema, Hemorrhage, Leukocytes, Japan.

In this quarterly report, the pathohistological findings of the intestinal membrane by rectal biopsies will be mentioned. The majority of cases were patients with bacillary dysentery. Biopsy of the mucosa was performed with forceps by sigmoidoscopic examination. The specimens were fixed in Zenker's solution immediately, paraffin sections were made, aand strained with Hematoxylin-Eosin solution and if necessary, Mallory' staining was used. (Author)

AD-438 459 Div. 16
OTS price $1.10

Tokyo Municipal Komagome Hospital (Japan).
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS.
Quarterly rept. no. 2, 1 May-31 July 62,
by Kazumine Kobari. 31 July 62, 7p.
Contract DA92 557FEC34616
Unclassified report

Descriptors: (*Infectious diseases, Gastrointestinal system), (*Gastrointestinal system, Infectious diseases), Salmonella, Diarrhea, Pathology, Japan.

In this quarterly report, an outbreak of gastroenteritis due to the infection due to salmonella thompson is mentioned. Eleven patients who were diagnosed as bacillary dysentery, were admitted to Tokyo Municipal Komagome Hospital on 27th June 1962. However, Salmonella Thompson was isolated from stool cultures of those cases were different from those of patients with bacillary dysentery. Sigmoidoscopically, findings of rectal and sigmoidal mucuous membranes were quite different from those seen in cases of bacillary dysentery. (Author)

AD-438 460 Div. 16
OTS price $1.10

Tokyo Municipal Komagome Hospital (Japan).
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS.
Quarterly rept. no. 3, 1 Aug-31 Oct 62,
by Kazumine Kobari. 31 Oct 62, 4p.
Contract DA92 557FEC34616
Unclassified report

Descriptors: (*Intestines, Infectious diseases), (*Dysentery, Pathology), Salmonella, Shigella, Chemotherapeutic agents, Japan.

AD-438 461 Div. 16
OTS price $4.60

Tokyo Municipal Komagome Hospital (Japan).
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS.
Rept. no. 2 (Final), 1 Feb 62-31 Jan 63,
by Kazumine Kobari. 31 Jan 63, 46p.
Contract DA92 557FEC34616
Unclassified report

Descriptors: (*Infectious diseases, Intestines), (*Intestines, Pathology), Medical examination, Etiology, Shigella, Salmonella, Cholera, Thresholds (Physiology), Membranes (Biology), Diagnosis, Photographs, Japan, Dysentery, Shigella dysenterae, Vibrio, Histology.

Comparative studies were made of the pathogenesis of intestinal infections due to shigella, salmonella, and cholera vibrio. The majority of cases revealed no typical or characteristic symptoms, but did show similar clinical pictures. The mutual relations between these intestinal infections are indicated in a schema. It was suspected from sigmoidoscopic examinations and biopsy studies that there may be a certain threshold in the pathological lesions of intestinal mucuous membrane to show typical symptoms which are specific for the infection. Characteristic clinical symptoms may be not revealed until the lesion exceeds the threshold. (Author)

AD-438 466 Div. 16
OTS price $1.60

Osaka Univ. (Japan).
ON THE DEFENCE MECHANISMS AGAINST INFECTION.
Quarterly rept. no. 2, 1 Jan-31 Mar 61,
by Tsunehisa Amano. 31 Mar 61, 13p.
Contract DA92 557FEC31897
Unclassified report

Descriptors: (*Leukocytes, Biological products), (*Immunity, Infectious diseases), Purification, Antigens and antibodies, Escherichia coli, Vibrio, Blood platelets, Staphylococcus, Streptococcus, Spleen, Bacillus anthracis, Enzymes, Japan.

a proposal for a relatively small, versatile Aerospace Environment Simulator designed to meet the specific requirement of aerospace medicine. (Author)

AD-438 144 Div. 16
OTS price $4.60

Geoscience Ltd., La Jolla, Calif.
THERMAL AND ELECTRICAL CONDUCTIVITIES OF BIOLOGICAL FLUIDS AND TISSUES.
Annual rept. 1 Apr 63-31 Mar 64,
by H. F. Poppendiek, N. D. Greene, J. H. Breeden, J. R. Murphy and P. M. Morehouse, 31 Mar 64, 41p.
Rept. no. 24
Contract Nonr409500
Unclassified report

Descriptors: (*Body fluids, Physical properties), (*Thermal conductivity, Body fluids), (*Electrical conductance, Body fluids), Test equipment, Blood, Hemolysis, Urine, Stomach, Fluids, Muscle, Blood plasma, Stress (Physiology), Temperature.

This report describes Geoscience's research on thermal and electrical conductivities of biological fluids and tissues. A literature search on thermal and electrical conductivity of biological materials was conducted. Analytical studies were initiated which will make it possible to estimate or establish the controlling variables of thermal and electrical conductivities of biological fluids and tissues. The results are for correlating more effectively the experimental measurements being obtained. (Author)

AD-438 197 Div. 16
OTS price $1.10

Tokyo Municipal Komagome Hospital (Japan).
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS.
Quarterly rept. no. 1, 1 Feb-30 Apr 61,
by Kazumine Kobari. 30 Apr 61, 3p.
Contract DA92 557FEC34616
Unclassified report

Descriptors: (*Infections, Intestines), (*Intestines, Infections), Pathology, Salmonella, Shigella, Escherichia, Microorganisms, Membranes (Biology), Japan.

AD-438 198 Div. 16
OTS price $1.10

Tokyo Municipal Komagome Hospital (Japan).
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTION.
Quarterly rept. no. 2, 1 May-31 Jul 61,
by Kazumine Kobari. 31 Jul 61, 3p.
Contract DA92 557FEC34616
Unclassified report

Descriptors: (*Intestines, Infections), (*Infections, Intestines), Pathology, Dysentery, Diarrhea, Histology, Antigens & antibodies, Japan.

AD-438 199 Div. 16
OTS price $1.10

Tokyo Municipal Komagome Hospital (Japan).
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS.
Quarterly rept. no. 3, 1 Aug-31 Oct 61,
by Kazumine Kobari. 31 Oct 63, 10p.
Contract DA92 557FEC34616
Unclassified report

Descriptors: (*Infections, Intestines), (*Intestines, Infections), Fluorescence, Antigens & antibodies, Shigella, Labeled substances, Body temperature, Pathology, Japan.

AD-438 200 Div. 16
OTS price $1.10

Keio Univ., Tokyo (Japan).
AUTOMATIC RECORDING OF PO2, PCO2, PH, Na AND K IN THE BLOOD AND THE BRAIN.
Semiannual rept. 24 July-31 Dec 63,
by Toyozo Aizawa. 31 Dec 63, 5p.
Grant DA CRD AG S92 544 63G16
Unclassified report

Descriptors: (*Respiration, Recording system), Sensitivity, Electrodes, Brain, Metabolism, Blood circulation, Cerebral cortex, Blood pressure, Anoxia, Japan.

AD-438 226 Div. 16
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE BIOCHEMICAL BASES FOR DEVELOPING PRODUCTS OF HIGHER BIOLOGICAL VALUE,
by A. A. Pokrovskiy. 13 Apr 64, 28p.
FTD TT64 148 Unclassified report

Trans. from Voprosy Pitaniya, 23:1, pp. 3-16, Jan-Feb 64.

Descriptors: (*Food, Biochemistry), Toxicity, Fatty acids, Fats, Vitamins, Energy, Proteins, Milk, Bread, Fruits, Amino acids, Metabolism, Nutrition, Diet, USSR, Meat, Vegetables, Humans.

AD-438 231 Div. 16, 28
OTS price $3.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
SOME SELECT PHYSIOLOGICAL, ANTHROPOMETRIC, AND HUMAN ENGINEERING DATA USEFUL IN VEHICLE DESIGN AND LOGISTIC PROBLEMS OF SPACE FLIGHT OPERATIONS,
by J. W. Carter. 24 Feb 60, 34p.
AMC RA DSP TM2 60 Unclassified report

Descriptors: (*Space flight, Operations), (*Space craft, Logistics), (*Logistics, Space flight), Aviation personnel, Physiology, Anthropometry, Human engineering, Work functions, Tolerance, Weightlessness, Radiation effects, Acceleration tolerance, Life support, Metabolism, Carbon dioxide, Noise, Vibration, Military requirements, Tables, Water, Food.

AD-438 389 Div. 16
OTS price $2.60

Cambridge Univ. (England).
STUDIES OF: (A) THE VISUAL FIELDS OF MONKEYS (B) MEMORY PROCESSES AS AFFECTED BY CEREBRAL LESIONS IN MONKEYS.
Final technical rept.
by Lawrence Weiskrantz. 30 Nov 63, 26p.
Grant AF EOAR63 34
AFOSR 64 0832 Unclassified report

Descriptors: (*Cerebral cortex, Damage), (*Visual perception, Cerebral cortex), (*Memory, Cerebral cortex), Monkeys, Visual acuity, Brain, Great Britain.

Analysis of the visual cortex and its relation to behaviour, and of the changes in mnemonic

Quarterly rept. no. 3, 1 May-31 Jul 61,
by Fumikazu Takaki. 31 Jul 61, 3p.
Contract DA92 557FEC34390
Unclassified report

Descriptors: (*Cells (Biology), Electron microscopy), (*Electron microscopy, Medical research), Liver, Kidneys, Heart, Muscles, Pathology, Mitochondria, Anoxia.

AD-438 534 Div. 16
OTS price $5.60

Jikei Univ. School of Medicine, Tokyo (Japan).
SUBJECT OF INVESTIGATION STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY.
Final rept., 1 Nov 60-31 Oct 61,
by Fumikazu Takaki. 31 Oct 61, 51p.
Contract DA92 557FEC34390
Unclassified report

Descriptors: (*Liver, Pathology), (*Kidneys, Pathology), (*Poisoning, Cells (Biology)), Microscopy, Electron microscopy, Carbon tetrachloride, Glycols, Mercury compounds, Chlorides, Japan.

Carbon tetrachloride, diethylene glycol and sublimate were respectively administered into the stomach of Wistar rats and periodical changes (15 min. - 2 days) occurring in liver cells and renal tubules were observed with light and electron microscopes. (Author)

AD-438 535 Div. 16
OTS price $1.10

Chiba Univ. (Japan).
STUDIES ON IMMUNOLOGICAL DIAGNOSIS OF PARAGONIMIASIS.
Quarterly rept., 21 Dec 60-20 Mar 61,
by Muneo Yokogawa. 21 Mar 61, 4p.
Contract DA92 557FEC33149
Unclassified report

Descriptors: (*Parasitic diseases, Japan), (*Chemotherapeutic agents, Parasitic diseases), Chemotherapeutic agents, Germicides, Antigens and antibodies, Public health.

AD-438 536 Div. 16
OTS price $1.10

Chiba Univ. (Japan).
STUDIES ON PARAGONIMIASIS.
Quarterly rept., 21 Mar-20 June 61,
by Muneo Yokogawa. 21 June 61, 3p.
Contract DA92 557FEC33149
Unclassified report

Descriptors: (*Parasitic diseases, Japan), (*Chemotherapeutic agents, Parasitic diseases), Germicides, Chemotherapeutic agents, Public health, Japan.

AD-438 537 Div. 16
OTS price $1.10

Chiba Univ. (Japan).
STUDIES ON PARAGONIMIASIS.
Quarterly rept., 21 June-20 Sep 61,
by Muneo Yokogawa. 21 Sep 61, 8p.
Contract DA92 557FEC33149
Unclassified report

Descriptors: (*Parasitic diseases, Japan), (*Chemotherapeutic agents, Parasitic diseases), Blood serum, Germicides, Chemotherapeutic agents, Antigens and antibodies, Public health, Japan.

AD-438 538 Div. 16
OTS price $7.60

Chiba U. (Japan).
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS.
Final rept. 21 Dec 60-20 Dec 61,
by Muneo Yokogawa. 20 Dec 61, 75p.
Contract DA92 557FEC33149
Unclassified report

Descriptors: (*Chemotherapeutic agents, Parasitic diseases), (*Epidemiology, Parasitic diseases), (*Parasitic diseases, Japan), Diagnosis, Antigens and antibodies, Lungs, Public health.

Bithionol has specific effect in paragonimiasis and is not toxic from the follow-up studies for one year after treatment with Bithinonol. This drug can be also effectively used for mass-treatment of paragonimiasis patients as outpatients. Criterion of cure of paragonimiasis judging by the disappearance of ova from the excreta is not always easy. The more exacting the criteria of cure, the longer the patients are followed up. However, serial examinations of the complement-fixation test after treatment is valuable for the criterion of cure. The new endemic area of paragonimiasis was found in west district of Shizuoka prefecture by using intradermal tes, complement-fixation test and stool examinations. (Author)

AD-437 539 Div. 16
OTS price $1.10

Hokkaido Univ., Sapporo (Japan).
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS.
Quarterly rept., 15 Dec 60-14 Mar 61,
by Sajiro Makino. 14 Mar 61, 10p.
Contract DA92 557FEC34462
Unclassified report

Descriptors: (*Radiation effects, Cells (Biology)), (*Chromosomes, Radiation effects), Beta particles, X rays, Gamma rays, Drosophila, Paramecium, Antigen-antibody reactions, Neoplasms, Germ cells, Aging (Physiology), Japan.

AD-438 540 Div. 16
OTS price $1.60

Hokkaido Univ., Sapporo (Japan).
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS.
Quarterly rept., 15 Mar-14 June 61,
by Sajiro Makino. 14 June 61, 15p.
Contract DA92 557FEC34462
Unclassified report

Descriptors: (*Radiation effects, Abstracts), (*Abstracts, Radiation effects), Cell division, Chromosomes, Beta particles, X rays, Gamma rays, Neoplasms, Cells (Biology), Drosophila, Paramecium, Antigen-antibody reactions, Germ cells, Japan.

AD-438 541 Div. 16
OTS price $1.60

Hokkaido Univ., Sapporo (Japan).
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS.
Quarterly rept., 15 Jun-14 Sep 61,
by Sajiro Makino. 14 Sep 61, 11p.
Contract DA92 557FEC34462
Unclassified report

AD-438 468 Div. 16
OTS price $1.10

Osaka Univ. (Japan).
ON THE DEFENCE MECHANISM AGAINST INFECTION.
Quarterly rept. no. 3, 1 Apr-30 Jun 61,
by Tsunehisa Amano. 30 Jun 61, 10p.
Contract DA92 557FEC31897
Unclassified report

Descriptors: (*Antibiotics, Effectiveness), (*Eubacteriales, Antigen-antibody reactions), Leukocytes, Enzymes, Bacteria, Sensitivity, Escherichia coli, Aerobacter aerogenes, Serratia marcescens, Salmonella, Shigella sonnei, Klebsiella pneumoniae, Pseudomonas aeroginosa, Neisseria gonorrhoeae, Bacillus anthracis, Vibrio comma, Vibrio, Staphylococcus, Salmonella typhosa, Staphylococcus aereus, Streptococcus, Bacillus subtilis, Bacillus, Proteus vulgaris, Diplococcus pneumoniae, Encapsulation, Test methods, Purification, Shigella flexneri.

AD-438 485 Div. 16
OTS price $2.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
ELECTROENCEPHALOGRAPHIC CHANGES IN HUMAN SUBJECTS DURING BLACKOUT PRODUCED BY POSITIVE ACCELERATION,
by Russell D. Squires, R. E. Jensen, W. C. Sipple and J. J. Gordon. 6 Apr 64, 22p.
NADC MA 6402, NAVMED MR005 13 0002 2, R12
Unclassified report

Descriptors: (*Electroencephalography, Blackout (Physiology)), (*Acceleration tolerance, Electroencephalography), Electronic equipment, Brain, Hypoxia, Aviation medicine, Blood pressure, Performance (Human), Band pass filters, Frequency analyzers.

Each of 13 human subjects was subjected alternately to a set of peak accelerations of 6 and 7 G on two separate occasions. Peak G was attained in approximately 30 seconds after the initiation of a symmetrical, sinusoidal acceleration profile. The best index of the level of consciousness appears to be the inverse relationship between the depth of blackout and the amplitude of EEG frequencies in the range of 5 cps. The lower delta frequencies were not used since artifacts due to electrode displacement resulting from head movement were seen most frequently in this range of frequencies. Moreover, the 5 to 7 cps. frequency band is associated with cerebral hypoxia which occurs during positive acceleration. This frequency band was also shown to be related to performance of specific performance tasks. (Author)

AD-438 528 Div. 16
OTS price $1.10

Sagamihara National Hospital (Japan).
THE IDENTIFICATION AND MODE OF ACTION OF MIYAGAWANELLA AS RELATED TO TRACHOMA, ATYPICAL PNEUMONIA AND OTHER CLINICAL DISORDERS INCLUDING THE THERAPEUTIC IMPLICATIONS THERE OF.
Quarterly rept. 15 Nov 60-14 Feb 61,
by Toshio Goto. 14 Feb 61, 6p.
Contract DA92 557FEC33048
Unclassified report

Descriptors: (*Microorganisms, Identification), (*Communicable diseases, Viruses), Antigens & antibodies, Immunity, Respiratory diseases, Blood serum, Dogs, Brain, Miyagawanella, Equines, Japan.

AD-438 529 Div. 16
OTS price $1.10

Sagamihara National Hospital (Japan).
THE IDENTIFICATION AND MODE OF ACTION OF MIYAGAWANELLA AS RELATED TO TRACHOMA, ATYPICAL PNEUMONIA AND OTHER CLINICAL DISORDERS INCLUDING THE THERAPEUTIC IMPLICATIONS THERE OF.
Quarterly rept. 15 Feb-14 May 61,
by Toshio Goto. 14 May 61, 9p.
Contract DA92 557FEC33048
Unclassified report

Descriptors: (*Communicable diseases, Viruses), Antigens & antibodies, Mice, Antibiotics, Chlortetracycline, Adaptation (Physiology), Pathology, Therapy, Birds, Miyagawanella, Japan.

AD-438 530 Div. 16
OTS price $1.60

Sagamihara National Hospital (Japan).
THE IDENTIFICATION AND MODE OF ACTION OF MIYAGAWANELLA AS RELATED TO TRACHOMA, ATYPICAL PNEUMONIA AND OTHER CLINICAL DISORDERS INCLUDING THE THERAPEUTIC IMPLICATIONS THEREOF.
Quarterly rept. 15 May-14 Aug 61,
by Toshio Goto. 14 Aug 61, 13p.
Contract DA92 557FEC33048
Unclassified report

Descriptors: (*Communicable diseases, Therapy), Tetracyclines, Antigens & antibodies, Blood serum, Viruses, Birds, Mice, Pathology, Liver, Spleen, Miyagawanella, Japan.

AD-438 531 Div. 16
OTS price $1.10

Jikei Univ. School of Medicine, Tokyo (Japan).
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY.
Quarterly rept. no. 1, 1 Nov 60-31 Jan 61,
by Fumikazu Takaki. 31 Jan 61, 4p.
Contract DA92 557FEC34390
Unclassified report

Descriptors: (*Tissues (Biology), Pathology), (*Cytology, Cancer), Histological techniques, Electron microscopy, Liver, Kidney, Heart, Cytochemistry, Toxins and antitoxins, Muscles, Freeze drying, Chemotherapy, Neoplasms.

AD-438 532 Div. 16
OTS price $1.10

Jikei U. School of Medicine, Tokyo (Japan).
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY.
Quarterly rept. no. 2, 1 Feb-30 Apr 61,
by Fumikazu Takaki. 30 Apr 61, 3p.
Contract DA92 557FEC34390
Unclassified report

Descriptors: (*Tissues (Biology), Pathology), (*Cytology, Cancer), Chemotherapy, Edema, Rats, Liver, Kidney, Abdomen, Neoplasms, Electron microscopy.

AD-438 533 Div. 16
OTS price $1.10

Jikei U. School of Medicine, Tokyo (Japan).
SUBJECT OF INVESTIGATION STUDIES OF THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY.

AD-438 654 Div. 16
OTS price $1.10

Sasaki Foundation, Medical Institution, Kanda (Japan).
STUDIES ON THE CHROMOSOMAL DIFFERENCES AMONG VARIOUS ASCITES HEPATOMAS OF RATS.
Progress rept., 15 Apr-14 Jul 61,
by Tomizo Yoshida. 14 Jul 61, 3p.
Contract DA92 557FEC31980
Unclassified report

Descriptors: (*Liver, Neoplasms), (*Neoplasms, Liver), Chromosomes, Microscopy, Laboratory animals, Rats, Japan, Amines, Aromatic compounds, Organic nitrogen compounds.

AD-438 656 Div. 16
OTS price $1.10

Tokugawa Inst. for Biological Research, Tokyo (Japan).
CHEMICAL COMPOSITION AND APPLICABILITY AS FOOD AND FEED OF MASS-CULTURED UNICELLULAR ALGAE.
Quarterly rept., 18 Jan-17 Apr 61,
by Hiroshi Tamiya. 17 Apr 61, 5p.
Contract DA92 557FEC33129
Unclassified report

Descriptors: (*Algae, Chemical analysis), (*Food, Algae), Nutrition, Mice, Diet, Decomposition, Molecular properties, Carbohydrates, Metabolism, Biochemistry, Glutathione, Japan.

Contents: Deteriorative change of Chlorella material occurring in long lasting outdoor cultures as reflected in partial decomposition of chlorophyll molecule; Carbohydrates contained in some blue-green algae; and Feeding of mice with chlorella-containing diet with special reference to its effect on the level of reduced glutathione in blood.

AD-438 657 Div. 16
OTS price $1.10

Tokugawa Inst. for Biological Research, Tokyo (Japan).
CHEMICAL COMPOSITION AND APPLICABILITY AS FOOD AND FEED OF MASS-CULTURED UNICELLULAR ALGAE.
Quarterly rept. 18 Apr-17 July 61,
by Hiroshi Tamiya. 17 July 61, 5p.
Contract DA92 557FEC33129
Unclassified report

Descriptors: (*Chlorella, Nutrition), Diet, Food, Rats, Colors, Chlorophylls, Alcohols, Methanols, Growth, Culture media.

AD-438 658 Div. 16
OTS price $1.10

Tokugawa Inst. for Biological Research, Tokyo (Japan).
CHEMICAL COMPOSITION AND APPLICABILITY AS FOOD AND FEED OF MASS-CULTURED UNICELLULAR ALGAE.
Quarterly rept. 18 July-17 Oct 61,
by Hiroshi Tamiya. 17 Oct 61, 5p.
Contract DA92 557FEC33129
Unclassified report

Descriptors: (*Algae, Food), (*Chemical analysis, Algae), Nutrition, Growth substances, Acids, Lactobacillus acidophilus, Carbohydrates, Metabolism.

Contents: Analysis of acid-extract of Chlorella cells having growth-promoting effect upon Lactobacilli, feeding test of pigs using a Chlorella-containing fodder, change in contents of carbohydrates and lipids in Chlorella cells grown under nitrogen-deficient conditions. (Author)

AD-438 665 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
ON THE GROWTH MECHANISM OF PSITTACOSIS-TRACHOMA VIRUSES IN TISSUE CULTURE.
Quarterly rept., 14 Dec 60-14 Mar 61,
by Noboru Higashi. 14 Mar 61, 2p.
Contract DA92 557FEC34501
Unclassified report

Descriptors: (*Viruses, Tissue culture), Growth, Adsorption, Nucleic acids, Analysis, Japan, Chemical analysis.

AD-438 666 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
ON THE GROWTH MECHANISM OF PSITTACOSIS-TRACHOMA VIRUSES IN TISSUE CULTURE.
Quarterly rept., 14 Mar-14 Jun 61,
by Noboru Higashi. 14 Jun 61, 2p.
Contract DA92 557FEC34501
Unclassified report

Descriptors: (*Viruses, Tissue culture), Cells (Biology), Desoxyribonucleic acids, Ribonucleic acids, Electron microscopy, Japan.

AD-438 667 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
ON THE GROWTH MECHANISM OF PSITTACOSIS-TRACHOMA VIRUSES IN TISSUE CULTURE.
Quarterly rept., 14 Jun-14 Sep 61,
by Noboru Higashi. 14 Sep 61, 2p.
Contract DA92 557FEC34501
Unclassified report

Descriptors: (*Viruses, Tissue culture), Growth, Morphology (Biology), Electron microscopy, Japan.

AD-438 681 Div. 16
OTS price $1.60

Kanazawa Univ., Ishikowa (Japan).
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM.
Quarterly rept. no. 2, 15 Apr-14 July 61,
by Yasuyuki Takagi. 14 July 61, 15p.
Contract DA92 557FEC34525
Unclassified report

Descriptors: (*Desoxyribonucleic acid, Synthesis), Biochemistry, Analysis, Mutations, Metabolism, Japan, Escherichia, Radiation effects, Biosynthesis, Labeled substances, Cell division.

AD-438 682 Div. 16
OTS price $1.60

Kanazawa Univ., Ishikawa (Japan).
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM.
Quarterly rept. no. 3, 15 Jul-14 Oct 61,
by Yasuyuki Takagi. 14 Oct 61, 12p.
Contract DA92 557FEC34525
Unclassified report

Descriptors: (*Desoxyribonucleic acids, Biosynthesis), (*Proteins, Biosynthesis), (*Liver, Regeneration), Tracer studies, Labeled substances, Antibiotics, Radioactive isotopes, Rats, Carboxylic acids, Amino acids, Japan, Pyrimidines, Mutations, Bacteria.

Descriptors: (*Radiation effects, Chromosones), (*Chemotherapy, Cancer), Japan, Gamma rays, Mice, Neoplasms, Germ cells, Cell division.

AD-438 542 Div. 16
OTS price $1.10

Kitasato Inst. (Japan).
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
Quarterly rept. no. 1, 1 Oct-31 Dec 60,
by Katsuhiko Tago, Yoshiyuki Yajima and Yoshio Matsumoto. 31 Dec 60, 5p.
Contract DA92 557FEC31914
Unclassified report

Descriptors: (*Quinolines, Germicides), (*Germicides, Quinolines), Phenols, Chelate compounds, Morphology (Biology), Bacteria, Staphylococcus aureus, Mycobacterium tuberculosis, Bacillus, Escherichia coli, Microscopy, Japan.

The estimation of antibacterial activity of oxine was performed in order to clarify the activity of oxine derivtives which will be used in the next experiment, on the relation between antibacterial potency and chelates formation. The morphoroxical changes of bacterial cells were observed both with a phase contrast microscope and electron-microscope. (Author)

AD-438 543 Div. 16
OTS price $1.10

Kitasato Inst. (Japan).
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
Quarterly rept. no. 2, 1 Jan-31 Mar 61,
by Katsuhiko Tago, Yoshiyuki Yajima and Yoshio Matsumoto. 31 Mar 61, 7p.
Contract DA92 557FEC31914
Unclassified report

Descriptors: (*Nuclei (Biology), Morphology (Biology)), (*Morphology (Biology), Antibiotics), (*Antiobiotics, Morphology (Biology)), (*Bacteria, Inhibition), Escherichia coli, Proteus vulgaris, Staphylococcus aureus, Bacillus subtilis, Metabolism, Carbohydrates, Chloramphenicol, Pentoses, Disaccharides, Japan.

AD-438 544 Div. 16
OTS price $1.60

Kitasato Inst. (Japan).
STUDIES ON THE MODE OF ACTION OF ANTIRACTERIAL DRUGS.
Quarterly rept. no. 3, 1 Apr-30 June 61,
by Katsuhiko Tago, Yoshiyuki Yajima and Yoshio Matsumoto. 30 June 61, 11p.
Contract DA92 557FEC31914
Unclassified report

Descriptors: (*Antibiotics, Metabolism), (*Bacteria, Inhibition), (*Metabolism, Bacteria), Chloramphenicol, Tracer studies, Labeled compounds, Adenine, Amino acids, Proteins, Nuclic acids, Biosynthesis, Glycoside hydrolases, Staphylococcus aureus, Bacillus, Respiration, Japan.

Inhibition of bacterial protein synthesis by Leucomycin and Chloramphenicol was compared through three different ways: direct estimation by Nessler's method, incorporation of 14C-glycin and induction of beta-galactosidase. Inhibition of nucleic acid synthesis was also examined by 14C-8-adenine incorporation. (Author)

AD-438 640 Div. 16, 28
OTS price $1.60

Nobel Inst. for Neurophysiology, Stockholm (Sweden).
RESEARCH ON BRAIN STEM MECHANISMS REGULATING AUTONOMIC ACTIVITIES.
Final technical rept.,
by Ulf Soderberg. 5 Feb 64, 18p.
Contract AF61 052 119
AFOSR 64 0733 Unclassified report

Descriptors: (*Brain, Autonomic nervous system), (*Autonomic nervous system, Brain), (*Homeostasis, Central nervous system), Psychiatry, Physiology, Nervous system, Pathology, Analysis, Cerebral cortex, Attention, Cardiovascular system, Stimulation, Nerve cells, Electricity, Experimental data.

Some neurophysiological aspects of the regulation of the homeostasis by the central nervous system have been studied and will be described. Attempts have also been made to analyze how such adjustments and how inefficient regulation due to inertial or pathological conditions can influence cerebral activities. Special emphasis has been laid on technical problems. The employment of the neuronally isolated cortex as an index of how the cortical tissue reacts to blood-borne influences is described. Brain-stem activities that are especially involved in autonomic functions and in particular in the arousal phenomenon are discussed. (Author)

AD-438 641 Div. 16, 30
OTS price $3.60

Illinois U., Urbana.
ELECTRON MICROSCOPE STUDY OF ULTRASONICALLY IRRADIATED MUSCLE.
Final rept. 1 Nov 62-1 Nov 63,
by W. J. Fry. 1 Nov 63, 37p.
Grant AF AFOSR62 128
AFOSR 64 0738 Unclassified report

Descriptors: (*Ultrasonic radiation, Muscles), (*Muscles, Ultrasonic radiation), Electroacoustic transducers, High frequency, Test equipment, Electron microscopy, Amphibians, Damage, Test methods.

AD-438 652 Div. 16
OTS price $1.10

Sasaki Foundation Medical Inst., Kanda (Japan).
STUDIES ON THE CHROMOSOMAL DIFFERENCES AMONG VARIOUS ASCITES HEPATOMAS OF RATS.
Progress rept., 15 Oct 60-14 Jan 61,
by Tomizo Yoshida. 14 Jan 61, 2p.
Contract DA92 557FEC31980
Unclassified report

Descriptors: (*Chromosomes, Neoplasma), (*Morphology (Biology), Chromosomes), Histology, Pathology, Cells (Biology), Mitosis.

AD-438 653 Div. 16
OTS price $1.10

Sasaki Foundation, Medical Institution, Kanda (Japan).
STUDIES ON THE CHROMOSOMAL DIFFERENCES AMONG VARIOUS ASCITES HEPATOMAS OF RATS.
Progress rept., 15 Jan-14 Apr 61,
by Tomizo Yoshida. 14 Apr 61, 2p.
Contract DA92 557FEC31980
Unclassified report

Descriptors: (*Liver, Neoplasms), (*Neoplasms, Liver), Chromosomes, Microscopy, Laboratory animals, Rats, Japan.

Descriptors: (*Japanese B encephalitis virus, Electron microscopy), Brain, Tissues (Biology), Mice, Cells (Biology).

AD-438 698 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
ANALYSIS OF THE DEVELOPMENT OF JAPANESE B ENCEPHALITIS VIRUS WITH THE ELECTRON MICROSCOPE.
Quarterly rept. no. 3, 15 Aug-14 Nov 61.
by Gonpachiro Yasuzumi. 14 Nov 61, 7p.
Contract DA92 557FEC34631
Unclassified report

Descriptors: (*Japanese B encephalitis virus, Electron microscopy), (*Thalamus, Virus diseases), Japan.

During the three months' study it has been revealed that development of the Japanese B encephalitis virus inoculated intracerebrally in the mouse may be more clearly traced in the thalamus than in the cerebral cortex of parietal lobus. The fine structure of the microglia and oligodendroglia cells in normal thalamus of a mouse has been observed in comparison with that infected with the Japanese B pencehalitus virus. (Author)

AD-438 699 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES.
Quarterly progress rept. no. 1, 15 Mar-14 June 61,
by Akira Inouye. 14 June 61, 8p.
Contract DA92 557FEC34753
Unclassified report

Descriptors: (*Proteins, Biosynthesis), Microsomes, Molecular properties, Physical chemistry, Electrophoresis, Electron microscopy, Cytochemistry.

AD-438 700 Div. 16
OTS price $1.10

Kyoto U. (Japan).
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES.
Quarterly progress rept. no. 2, 15 Jun-14 Sep 61,
by Akira Inouye. 14 Sep 61, 8p.
Contract DA92 557FEC34753
Unclassified Report

Descriptors: (*Ribosomes, Molecular properties), Electron microscopy, Ribonucleic acids, Physical chemistry, Temperature, Particles, Japan.

AD-438 701 Div. 16
OTS price $1.10

Kyoto U. (Japan).
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES.
Quarterly progress rept. no. 3, 15 Sep-14 Dec 61,
by Akira Inouye. 14 Dec 61, 8p.
Contract DA92 557FEC34753
Unclassified report

Descriptors: (*Ribosomes, Molecular properties), Physical chemistry, Electron microscopy, Magnesium, Ions, Particles, Synthesis (Chemistry), Japan.

AD-438 741 Div. 16
OTS price $1.10

Keio U., Tokyo (Japan).
BIOLOGICAL AND IMMUNOLOGICAL STUDIES ON TOXOPLASMA.
Quarterly rept. no. 3, 1 Apr-30 Jun 61,
by Hisakichi Matsubayashi. 30 Jun 61, 5p.
Contract DA92 557FEC31899
Unclassified report

Descriptors: (*Toxoplasma, Morphology (Biology)), Viability, Japan, Immunology, Mice, Tissue culture.

AD-438 742 Div. 16
OTS price $1.10

Kyoto U. (Japan).
METABOLIC FUNCTION OF EDOXYNUCLEOSIDIC COMPOUNDS.
Quarterly rept., 1 July-30 Sep 62,
by Osamu Hayaishi. 30 Sep 62, 4p.
Contract DA92 557FEC35976
Unclassified report

Descriptors: (*Nucleotidyl transferases, Purification), (*Thymus, Nucleotidyl transferases), Japan, Enzymes.

AD-438 743 Div. 16
OTS price $1.10

Hiroshima Univ. (Japan).
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION.
Semiannual rept. 30 July 63-29 Jan 64,
by Hiroshi Irisawa. 29 Jan 64, 6p.
Contract DA92 557FEC36882
Unclassified report

Descriptors: (*Neuromuscular transmission, Excitation), Muscles, Tissues (Biology), Urinary system, Voltage, Guinea pigs, Nerve impulses, Polarization, Time, Membranes (Biology), Electrical conductance, Temperature, Amphibians, Heart, Ions, Sodium.

The intracellular action potential of the mammalian ureter was studied to solve the following: (1) whether repolarization phase can be superimposed, (2) the response to the ion concentration of extracellular bathing fluid and (3) the response of chemical substances such as autonomic-neuroeffectors. (Author)

AD-438 745 Div. 16
OTS price $1.10

Tokyo Metropolitan Ebara Infectious Disease Hospital (Japan).
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS).
Quarterly rept., 1 Oct-31 Dec 61,
by Yasuzo Nakamizo. 31 Dec 61, 5p.
Contract DA92 557FEC35580
Unclassified report

Descriptors: (*Shigella sonnei, Agglutinins), (*Antigens & antibodies, Shigella flexneri), Blood serum, Infections.

AD-438 746 Div. 16
OTS price $1.10

Tokyo National Sanatorium (Japan).
STUDIES ON ISONIAZID METABOLISM IN JAPANESE AND

AD-438 683 Div. 16
OTS price $1.60

Kanazawa Univ., Ishikawa (Japan).
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM.
Quarterly rept. no. 1, 15 Jan-14 Apr 61,
by Yasuyuki Takagi. 14 Apr 61, 8p.
Contract DA92 557FEC34525
Unclassified report

Descriptors: (*Desoxyribonucleic acid, Metabolism), Chromosomes, Cells (Biology), Biosynthesis, Cell division, Nucleic acids, Nucleotides, Genetics, Tissues (Biology), Biochemistry, Streptomyces, Escherichia, Japan.

AD-438 684 Div. 16
OTS price $1.10

Hiroshima Univ. (Japan).
RELATION BETWEEN MUSCLE RELAXATION AND THE ENVIRONMENTAL ELECTROLYTES.
Quarterly rept. no. 1, 15 June-14 Sep 61,
by Hiroshi Irisawa. 14 Sep 61, 4p.
Contract DA92 557FEC34980
Unclassified report

Descriptors: (*Muscle, Histology), (*Heart, Anatomy), Mollusca, Crustacea, Physiology, Japan, Relaxation (Physiology), Electrolytes (Physiology).

AD-438 685 Div. 16
OTS price $1.10

Hiroshima Univ. (Japan).
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT SIMULATION.
Quarterly rept. 16 Sep-15 Dec 61,
by Hiroshi Irisawa. 15 Dec 61, 4p.
Contract DA92 557FEC34980
Unclassified report

Descriptors: (*Muscles, Relaxation (Physiology)), Heart, Aquatic animal, Invertebrates, Mollusca, Analysis, Cells (Biology), Stomach, Guinea pigs, Membranes (Biology), Rats, Dogs, Nervous system, Excitation, Japan.

AD-438 691 Div. 16
OTS price $1.10

Keio Univ. (Japan).
CORRELATION BETWEEN SUSCEPTIBILITY TO ORAL INFECTION AND INTESTINAL BACTERIAL FLORA IN THE INBRED MOUSE STRAINS RAISED BY SELECTIVE BROTHER-SISTER MATINGS IN OUR LABORATORY,
Quarterly rept. no. 1, 1 Feb-30 Apr 61,
by Shogo Sasaki. 30 Apr 61, 6p.
Contract DA92 557FEC34627
Unclassified report

Descriptors: (*Salmonella, Infections), Immunity, Mice, Intestines, Microorganisms, X-rays, Shigella, Japan.

AD-438 692 Div. 16
OTS price $2.60

Keio Univ., Tokyo (Japan).
CORRELATION BETWEEN SUSCEPTIBILITY TO ORAL INFECTION AND INTESTINAL BACTERIAL FLORA IN THE INBRED MOUSE STRAINS RAISED BY BROTHER-SISTER MATINGS IN OUR LABORATORY.
Quarterly rept. no. 3, 1 Aug-31 Oct 61,
by Shogo Sasaki. 31 Oct 61, 23p.
Contract DA92 557FEC34627
Unclassified report

Descriptors: (*Bacteria, Intestines), (*Mouth, Infections), Chemotherapy, Antibiotics, Salmonella, Streptomycins, Neomycins, Mice, Immunity, Japan.

AD-438 693 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS.
Quarterly rept. no. 1, 15 Feb-14 May 61,
by Gonpachiro Yasuzumi. 14 May 61, 4p.
Contract DA92 557FEC34626
Unclassified report

Descriptors: (*Infectious hepatitis, Pathology), (*Liver, Electron microscopy), Japan.

AD-438 694 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS.
Quarterly rept. no. 2, 15 May-14 Aug 61,
by Gonpachiro Yasuzumi. 14 Aug 61, 7p.
Contract DA92 557FEC34626
Unclassified report

Descriptors: (*Hepatitis (Nonviral), Electron microscopy), Cells (Biology), Liver, Tissues (Biology), Cytoplasm, Mitochondria, Membranes (Biology).

AD-438 695 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS.
Quarterly rept. no. 3, 15 Aug-14 Nov 61,
by Gonpachiro Yasuzumi. 14 Nov 61, 8p.
Contract DA92 557FEC34626
Unclassified report

Descriptors: (*Hepatitis (Nonviral), Electron microscopy), Tissues (Biology), Cells (Biology), Mitochondria, Analysis, Nuclei (Biology), Membranes (Biology).

AD-438 696 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
ANALYSIS OF THE DEVELOPMENT OF JAPANESE B ENCEPHALITIS VIRUS WITH THE ELECTRON MICROSCOPE.
Quarterly rept. no. 1, 15 Feb-14 May 61,
by Gonpachiro Yasuzumi. 14 May 61, 5p.
Contract DA92 557FEC34631
Unclassified report

Descriptors: (*Japanese B encephalitis virus, Electron microscopy), Analysis, Cerebral cortex, Infections, Cytoplasm, Membranes (Biology).

AD-438 697 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
ANALYSIS OF THE DEVELOPMENT OF JAPANESE B ENCEPHALITIS VIRUS WITH THE ELECTRON MICROSCOPE.
Quarterly rept. no. 2, 15 May-14 Aug 61,
by Gonpachiro Yasuzumi. 14 Aug 61, 6p.
Contract DA92 557FEC34631
Unclassified report

by Ralph Wadeson. 15 Apr 64, 5p.
Contract DA49 193MD2461
Unclassified report

Descriptors: (*Endocrine glands, Nervous system), (*Epilepsy, Endocrine glands), Surgery, Excretion, Behavior, Reaction (Psychology), Therapy, Medical examination, Urine, Inhibition, Hormones.

Preliminary results from a detailed longitudinal study of two patients before and after temporal lobectomy for epilepsy indicate that basal levels of urinary 17-OH-CS excretion decline appreciably by the third week following surgery. Evaluation of these findings from the standpoint of the duration or permanency of the hormonal change and its possible correlation with post-operative psychological changes or therapeutic effectiveness of surgery is now being carried out in follow-up observations. After temporary disruption of the project due to relocation of laboratory facilities, studies have been resumed which will extend the number of patients and the number of hormones under observation. (Author)

AD-438 886 Div. 16
OTS price $1.10

California Univ., Los Angeles.
MOSQUITOES OF MIDDLE AMERICA.
Annual progress rept., 1 Aug 63-30 Apr 64,
by John N. Belkin. 1 May 64, 4p.
Contract DA49 193md2478
Unclassified report

Descriptors: (*Culicidae, Central America), (*Insects, Central America), Aedes, Scientific research, Central America, Panama, Mexico, West Indies, French Guiana, British Guiana, Surinam, Ecuador, Colombia, Venezuela.

Material was collected and reared by cooperators in Panama, Canal Zone, Grenada, St Vincent, Trinidad and Jamaica. Standardized collecting and storage equipment (including plastics) and field record forms for bionomics were developed. About 850 collections were processed and about 10,000 slides and 20,000 adults were prepared in Los Angeles. A looseleaf catalog of all nominal species reported from Middle America was begun. Preliminary identifications were made for 400 collections and some 200 species were recognized. Preliminary drawings of the complete larval and/or pupal chaetotaxy of 25 species were prepared. Arrangements were made for quick economical photo-offset publication of review and descriptive papers with emphasis on illustrations. (Author)

AD-438 895 Div. 16
OTS price $10.50

USAF Radiation Lab., U. of Chicago, Ill.
(No title).
Quarterly progress rept. no. 51.
15 Apr 64, 131p.
Contract AF41 609 1693, Proj. 7757 02
Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Radiation effects, Tissues (Biology)), (*Radioprotective agents, Chemical compounds), (*Biochemistry, Radioprotective agents), Toxicity, Radiation injuries, Fast neutrons, Gamma rays, X rays, Sodium compounds, Lethal dosage, Steroids, Survival, Rats, Mice, Sodium compounds, Enzymes.

Contents: Studies on the Toxicity and Mechanism of Action of 2-Mercaptoethylamine; Influence of X-irradiation on the Development of a Thiophosphate-Oxidizing Enzyme System in the Livers of Rats; Influence of Steroids and Other Factors on the Development of Radiation Sensitive Detoxification Systems; Effects of 2-Imino-thiazolidine-4-carboxylic Acid on the Radioprotective Activity of Various Chemical Agents; The Influence of Various Chemical Compounds on Radiation Lethality in Mice; Dose-Mortality Relationships for Several Radioprotective Agents; Further Studies on the Role of Sodium Nitrite in Radioprotection in Mice; Chemical Radioprotection Against Absorber-moderated Protons; Effect of the Addition of 2-Mercaptoethylamine or Para-aminopropiophenone to the Diets of Chronically Irradiated Mice and the Production of Methemoglobin by Feeding a Diet Containing Para-aminopropiophenone. (Author)

AD-438 909 Div. 16
OTS price $2.60

School of Aerospace Medicine, Brooks AFB, Tex.
OXYGEN AND THE EYE,
by Cecil C. Beehler. Feb 64, 23p.
SAM B R3 64 Unclassified report

Descriptors: (*Eye, Oxygen), (*Oxygen, Eye), Reviews, Bibliographies, Toxicity, Medical research, Retina, Cornea, Exposure, Hazards.

The current interest in biomedical research, calling for human beings to be subjected to prolonged exposure to high oxygen environments, requires careful consideration of the possible hazards involved. A review of the literature clearly indicates that oxygen is capable of producing severe systemic toxicity. In the 1950's it was found that prolonged exposure to oxygen was responsible for retrolental fibroplasia in premature infants. Consideration of the physiology of increased oxygen tensions of the eye shows that, as compared with other tissues, unusually high tensions may occur in the aqueous and vitreous. Experimental studies in many animals have revealed a variety of pathologic changes, some of which resemble those found in retrolental fibroplasia. Recent studies have found that these changes are not limited to immature animals. (Author)

AD-439 015 Div. 16
OTS price $1.60

Nara Medical Coll. (Japan).
ANALYSIS OF THE DEVELOPMENT OF JAPANESE B ENCEPHALITIS VIRUS WITH THE ELECTRON MICROSCOPE.
Quarterly rept. no. 1, 15 Feb-14 May 62,
by Gonpachiro Yasuzumi. 14 May 62, 15p.
Contract DA92 557FEC34631
Unclassified report

Descriptors: (*Japanese B encephalitis virus, Analysis), Histology, Cells (Biology), Mice, Brain, Identification, Electron microscopy, Cytoplasm, Nerve cells, Mitochondria, Nuclei (Biology), Particles, Japan.

AD-439 016 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
ANALYSIS OF THE DEVELOPMENT OF JAPANESE B ENCEPHALITIS VIRUS WITH THE ELECTRON MICROSCOPE.
Quarterly rept. no. 3, 15 Aug-14 Nov 62,
by Gonpachiro Yasuzumi. 14 Nov 62, 9p.
Contract DA92 557FEC34631
Unclassified report

ISONIAZID RESISTANCE.
Quarterly rept. 1 Oct 60-30 Sep 61,
by Shigeichi Sunahara. 30 Sep 61, 10p.
Contract DA92 557FEC31913
Unclassified report

Descriptors: (*Isoniazid, Metabolism), (*Chemotherapy, Isoniazid), Japan, Antitubercular agents, Culture media, Children, Antigens and antibodies, Genetics, Perodidase, Catalase, Dosage.

AD-438 747 Div. 16
OTS price $1.10

Tokyo National Sanatorium (Japan).
STUDIES ON METABOLISM OF ISONIAZID.
Quarterly rept. no. 3, 1 Oct 60-30 Sep 61,
by Shigeichi Sunahara. 30 Sep 61, 9p.
Contract DA92 557FEC31913
Unclassified report

Descriptors: (*Isoniazid, Metabolism), (*Chemotherapy, Mycobacterium tuberculosis), Dose rate, Japan, Hydrazones, Urine, Glutaric acids, Pyruvic acid.

AD-438 748 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
EXPERIMENTAL SURGERY ON RESUSCITATION OF AMPUTATED OR NEARLY AMPUTATED LEG.
Quarterly rept. no. 2, 1 Feb-30 Apr 61,
by Yutaka Onji. 30 Apr 61, 7p.
Contract DA92 557FEC34352
Unclassified report

Descriptors: (*Amputation stumps, Blood circulation), (*Blood circulation, Amputation stumps), Blood vessels, Surgical techniques, Oxygen equipment, Surgery, Blood plasma, Glucose, Pyruvates, Lactic acid, Phosphorus, Metabolism, Japan.

AD-438 751 Div. 16
OTS price $1.10

Tokyo Biochemical Research Foundation, Toshima-ku (Japan).
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY.
Quarterly rept., 15 Sep-14 Dec 62,
by Norio Shimazono. 14 Dec 62, 3p.
Contract DA92 557FEC36145
Unclassified report

Descriptors: (*Carbohydrates, Metabolism), (*Metabolism, Carbohydrates), Biochemistry, Liver, Spleen, Tissues (Biology), Adrenal glands, Muscles, Rats, Brain, Kidneys, Fats, Diet, Spectrophotometer, Adaptation, (Physiology), Japan.

AD-438 752 Div. 16
OTS price $1.10

Tokyo Biochemical Research Foundation (Japan).
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY.
Quarterly rept., 15 June-15 Sep 62,
by Norio Shimazono. 15 June 62, 3p.
Contract DA92 557FEC36145
Unclassified report

Descriptors: (*Carbohydrates, Metabolism), (*Metabolism, Carbohydrates), Biochemistry, Phosphates, Diet, Rats, Tissues (Biology), Liver, Kidneys, Adrenal glands, Muscles, Spleen, Brain, Enzymes.

AD-438 753 Div. 16
OTS price $1.10

Tokyo Biochemical Research Foundation (Japan).
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY.
Quarterly rept., 15 June-14 Sep 62,
by Norio Shimazono. 14 Sep 62, 4p.
Contract DA92 557FEC36145
Unclassified report

Descriptors: (*Carbohydrates, Metabolism), (*Metabolism, Carbohydrates), Nutrition, Liver, Enzymes, Diet, Rats, Yeasts, Adaptation, Inhibition, Proteins, Synthesis.

AD-438 783 Div. 16
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TECHNICAL PROCEDURES FOR DETECTING WEAK BIOELECTRICAL RESPONSES,
by V. A. Kozhevnikov. 24 Mar 64, 14p.
FTD TT63 1194 Unclassified report

Trans. from Electronika V Meditsine, pp. 120-129, 1960.

Descriptors: (*Electroencephalography, Sensitivity), Signals, Brain, Stimulation, Detection, Noise, Oscillographs, USSR.

AD-438 825 Div. 16, 24
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
RECORDERS IN ELECTROMEDICAL DIAGNOSTIC APPARATUS,
by B. N. Livshits and N. A. Solov'yev.
23 Mar 64, 10p.
FTD TT63 1195 Unclassified report

Trans. from Elektronika V Meditsine, Gosenergoizdat, Moskva-Leningrad, pp. 130-136, 1960.

Descriptors: (*Diagnosis, Recording systems), (*Recording systems, Diagnostic agents), Cathode ray tubes, Photographic recording systems, Photographic materials, Oscillograph, Medical equipment.

AD-438 884 Div. 16
OTS price $1.60

Institute of Marine Science, U. of Alaska, Douglas.
OBSERVATIONS ON THE CIRRAL ACTIVITY OF CERTAIN SPECIES OF SESSILE BARNACLES (CIRRIPEDIA) ON THE COASTS OF NORTH AMERICA, WITH INVESTIGATIONS ON THE PHYSIOLOGY OF SHALLOW WATER POGONOPHORA OF THE ARCTIC OCEAN.
Final rept., 1 Jan-31 Dec 63,
by A. J. Southward, J. J. Gonor and E. B. Cutler.
Dec 63, 13p.
Contract Nonr G00024-63, Proj. NR104 733
Unclassified report

Descriptors: (*Barnacles, Collecting methods), North America, Temperature, Tolerances (Physiology), Illumination, Arctic Ocean, Analysis, Marine biology.

AD-438 885 Div. 16
OTS price $1.10

Washington School of Psychiatry, D. C.
NEUROENDOCRINE STUDIES OF EPILEPTIC PATIENTS.
Annual progress rept. 1 Jul-1 Apr, 64.

by Gonpachiro Yasuzumi. 14 Aug 62, 11p.
Contract DA92 557FEC34631
Unclassified report

Descriptors: (*Japanese B encephalitis virus, Electron microscopy), Analysis, Japan, Tissues (Biology), Brain, Nervous system, Mice, Cell (Biology), Nerve cells, Cytoplasm.

AD-439 052 Div. 16
OTS price $1.60

Nara Medical Coll. (Japan).
ANALYSIS OF THE DEVELOPMENT OF JAPANESE B ENCEPHALITIS VIRUS WITH THE ELECTRON MICROSCOPE.
Semiannual rept. 15 Feb-14 Aug 63,
by Gonpachiro Yasuzumi. 14 Aug 63, 15p.
Contract DA92 557FEC36512
Unclassified report

Descriptors: (*Japanese B encephalitis virus, Electron microscopy), Mice, Thalamus, Brain, Infections, Particles, Ribosomes, Nerve cells, Ganglia, Japan.

Microglial cells in the hypothalamus of mice 2 to 4 days after inoculation of the JBE virus were observed in thin sections with the electron microscope. Virus particles 30 to 36 mu in diameter are found in vesicles, as dense spherical particles in Os04-fixation and less dense in permanganate-fixation. Precursor particles 20 millimicrons in diameter have been noticed, which are originated from the nuclei. (Author)

AD-439 053 Div. 16
OTS price $1.60

Nara Medical Coll. (Japan).
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS.
Semiannual rept., 15 Feb-14 Aug 63,
by Gonpachiro Yasuzumi. 14 Aug 63, 11p.
Contract DA92 557FEC36513
Unclassified report

Descriptors: (*Medical research, Japan), (*Virus diseases, Infectious hepatitis), (*Liver, Pathology), Electron microscopy, Nucleus (Biology), Membranes (Biology), Cytoplasm, Granules, Mitochondria, Ribosomes, Glycogen.

AD-439 055 Div. 16
OTS price $1.10

Hokkaido Univ., Sapporo (Japan).
EFFECT OF NEUROHYPOPHYSIAL HORMONE ON THYROID ACTIVITY.
Semiannual rept., 15 May-14 Nov 63,
by Shinji Itoh. 14 Nov 63, 4p.
Contract DA92 557FEC35984
Unclassified report

Descriptors: (*Thyroid gland, Hormones), (*Hormones, Thyroid gland), Rats, Thyrotropin, Vasoactive agents, Metabolism, Mice.

AD-439 056 Div. 16
OTS price $1.10

Jikei Univ., Tokyo (Japan).
GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIAL DNA.
Rept. no. 2, 20 Apr-19 July 62,
by Isamu Kondo. 19 July 62, 3p.
Contract DA92 557FEC35778
Unclassified report

Descriptors: (*Bacteriophages, Culture media), (*Culture media, Bacteriophages), Chemical analysis, Genetics, Antigen and antibodies.

AD-439 060 Div. 16
OTS price $1.10

Hokkaido Univ., Sapporo (Japan).
ON THE EFFECT OF NEUROHYPOPHYSIAL HORMONE ON THYROID ACTIVITY.
Quarterly rept., 14 May-15 Aug 62,
by Shinji Itoh. 15 Aug 62, 4p.
Contract DA92 557FEC35984
Unclassified report

Descriptors: (*Hormones, Thyroid gland), (*Thyroid gland, Biochemistry), (*Thyroid gland, Hormones), Injection, Drugs, Vasoactive agents, Inhibition, Secretion, Thyroxine, Exposure, Thyrotropin, Stimulation, Temperature, Body weight, Pathology, Histology.

AD-439 061 Div. 16
OTS price $1.10

Hokkaido Univ., Sapporo (Japan).
ON THE EFFECT OF NEUROHYPOPHYSIAL HORMONE ON THYROID ACTIVITY.
Quarterly rept. 16 Aug-15 Nov 62,
by Shinji Itoh. 15 Nov 62, 4p.
Contract DA92 557FEC35984
Unclassified report

Descriptors: (*Thyroid gland, Pituitary hormones), Stimulation, Thyroid & antithyroid agents, Vasoactive agents, Rats, Exposure.

The findings did not demonstrate any stimulative effect of exogenous vasopressin on the thyroidal activity of rats, but a suppressive effect was noted when the activity was increased in a cold environment. In a moderate environmental temperature of 20 C, neither stimulative nor inhibitory effect was observed. These results coincide with the histological findings previously reported. (Author)

AD-439 062 Div. 16
OTS price $1.10

Kanazawa Univ., Ishikawa (Japan).
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM.
Quarterly rept. no. 1, 15 Jan-14 Apr 62,
by Yasuyuki Takagi. 14 Apr 62, 7p.
Contract DA92 557FEC34515
Unclassified report

Descriptors: (*Deoxyribonucleic acid, Metabolism), Cells (Biology), Chromosomes, Nuclei (Biology), Cell division, Synthesis, Mutations, Radiation effects, Drugs, Escherichia, Ultraviolet radiation, Labeled substances, Japan.

AD-439 063 Div. 16
OTS price $1.10

Kanazawa Univ., Ishikawa (Japan).
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM.
Quarterly rept. no. 2, 15 Apr-14 July 62,
by Yasuyuki Takagi. 14 July 62, 2p.
Contract DA92 557FEC34525
Unclassified report

Descriptors: (*Deoxyribonucleic acid, Metabolism), Radiation effects, Synthesis, Mutations, Labeled substances, Antibiotics, Escherichia, Phosphates, Tracer studies, Radioactive isotopes, Nucleosides, Japan.

Descriptors: (*Japanese B encephalitis virus, Analysis), Nervous system, Tissues (Biology), Brain, Cells (Biology), Particles, Mice, Membranes (Biology), Nerve cells, Ribosomes.

AD-439 020 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
STUDIES ON THE HEMOGLOBIN-OXYGEN EQUILIBRIUM.
Quarterly rept. no. 2, 1 Sep-30 Nov 62,
by Itiro Tyuma. 30 Nov 62, 9p.
Contract DA92 557FEC36081
Unclassified report

Descriptors: (*Hemoglobin, Chemical properties), (*Oxygen, Stability), Japan, Rabbits, Humans, Electrophoresis, Spectrophotometers, Amino acids, Ultraviolet spectrophotometers.

AD-439 021 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG.
Quarterly rept. no. 2, 13 Feb-12 May 62,
by Yutaka Onji. 12 May 62, 8p.
Contract DA92 557FEC35698
Unclassified report

Descriptors: (*Legs, Surgery), Blood circulation, Oxygen equipment, Oxygen consumption, Glucose, Blood, Blood volume, Temperature, Muscles, Japan.

AD-439 022 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG.
Quarterly rept. no. 1, 13 Nov 61-12 Feb 62,
by Yutaka Onji. 12 Feb 62, 7p.
Contract DA92 557FEC35698
Unclassified report

Descriptors: (*Medical research, Japan), (*Surgery, Legs), Blood vessels, Blood circulation, Laboratory animals, Dogs.

AD-439 023 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG.
Quarterly rept. no. 3, 13 May-12 Aug 62,
by Yutaka Onji. 12 Aug 62, 8p.
Contract DA92 557FEC35698
Unclassified report

Descriptors: (*Amputation stumps, Metabolism), (*Physiology, Amputation stumps), Oxygen consumption, Glucose, Blood circulation, Nerve fibers, Surgery, Legs, Temperature, Japan.

Contents: The influence of leg temperature upon oxygen and glucose consumption by the leg under artificial perfusion; The influence of presence and absence of nerve upon the oxygen and glucose consumption under artificial perfusion; The influence of time interval between the amputation of leg and the institution of artificial perfusion on metabolism. (Author)

AD-439 024 Div. 16
OTS price $1.60

Nara Medical Coll. (Japan).
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG.
Semiannual rept. no. 1, 13 Nov 62-12 Man 63,
by Yutaka Onji. 12 May 63, 15p.
Contract DA92 557FEC35698
Unclassified report

Descriptors: (*Surgery, Amputation stumps), (*Amputation stumps, Metabolism), Surgical techniques, Histology, Muscles, Oxygen consumption, Blood circulation, Adenosine phosphates, Glucose, Phosphorylation, Enzymes, Japan.

AD-439 026 Div. 16
OTS price $1.10

Nara Medical Coll. (Japan).
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS.
Quarterly rept. no. 1, 15 Feb-14 May 62,
by Gonpachiro Yasuzumi. 14 May 62, 8p.
Contract DA92 557FEC34626
Unclassified report

Descriptors: (*Infectious hepatitis, Electron microscopy), Cytoplasm, Liver, Japan, Infections, Cells (Biology), Glycogen, Distribution, Particles, Mitochondria.

AD-439 027 Div. 16
OTS price $1.60

Nara Medical Coll. (Japan).
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS.
Quarterly rept. no. 2, 15 May-14 Aug 62,
by Gonpachiro Yasuzumi. 14 Aug 62, 12p.
Contract DA92 557FEC34626
Unclassified report

Descriptors: (*Infectious hepatitis, Liver), (*Liver, Infectious hepatitis), Electron microscopy, Mitochondria, Nuclei (Biology).

The present observations were made during studies of biopsy materials of liver in cases of infectious hepatitis in order to look for virus-like particles and also to learn about characteristics of the liver cell that might have bearing on susceptibility or resistance to infection. (Author)

AD-439 028 Div. 16
OTS price $1.60

Nara Medical Coll. (Japan).
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS.
Quarterly rept. no. 3, 15 Aug-14 Nov 62,
by Gonpachiro Yasuzumi. 14 Nov 62, 17p.
Contract DA92 557FEC34626
Unclassified report

Descriptors: (*Hepatitis viruses, Electron microscopy), Kidneys, Hemolysis, Cells (Biology), Cytoplasm, Infections.

AD-439 049 Div. 16
OTS price $1.60

Nara Medical Coll. (Japan).
ANALYSIS OF THE DEVELOPMENT OF JAPANESE B ENCEPHALITIS VIRUS WITH THE ELECTRON MICROSCOPE.
Quarterly rept. no. 2, 15 May-14 Aug 62,

proportionally to a nominal ventricular stroke volume by the ratio of thorax volume to the average measured impedance. A value of cardiac output, determined from the product of this ventricular stroke volume and the pulse rate, was determined for various subject body types and used to compute the cardiac index and cardiac output per unit body mass. The data were representative of the data reported in the literature. The correlation of cardiac output values, determined from the impedance product, with oxygen consumption rates was found to be 0.962. Compared with results reported by other laboratories, where standard procedures are used for cardiac output determinations, the data compared favorably when a constant correction factor was added. (Author)

AD-439 097 Div. 16
OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
MICROBIOLOGIC STUDIES OF THE TWO-MAN SPACE CABIN SIMULATOR. INTERCHANGE OF ORAL AND INTESTINAL BACTERIA,
by James E. Moyer and Y. Z. Lewis. Mar 64, 14p.
Task 793002
SAM 3 TDR64 3 Unclassified report

Descriptors: (*Spacecraft cabins, Simulators), (*Bacteria, Spacecraft cabins), Microbiology, Bacteria, Gastrointestinal system, Aerobiology, Confined environments, Medical examination.

Studies were initiated to gain an understanding of the degree of microbic interchange to be expected between individuals under conditions of close occupancy, as would occur during space travel. Experiments were performed on subjects confined within the two-man space cabin simulator at the USAF School of Aerospace Medicine, Brooks, Air Force Base, Tex. Results from 11 experiments, lasting from 14 to 30 days, are presented. Oral and intestinal surveys were conducted on each individual prior to, during, and following confinement. Marker organisms, initially harbored by only one of the individuals, were used to establish evidence of microbic interchange. Implications of these findings, as related to future space flights, are discussed. (Author)

AD-439 206 Div. 16
OTS price $1.60

Army Missile Test and Evaluation Directorate, White Sands Missile Range, N. Mex.
MICROFLORA AT KWAJALEIN ISLAND,
by Oscar H. Calderon. Apr 64, 13p.
AMTED TN55; EI 2 64 Unclassified report

Descriptors: (*Microorganisms, Kwajalein atoll), (*Fungi, Kwajalein atoll), Fusarium, Penicillium, Ascomycetes, Molds (Organisms), Sclerotinia, Deuteromycetes (Imperfect fungi).

A study was made of microorganisms present in the coral soil of Kwajalein Island. A total of 19 Fungal and 3 bacterial genera were recognized. These organisms were allowed to colonize sterilized plant stems and following subsequent growth from the stems into the agar were isolated and later identified by subculturing on selective medias. The total percent occurrence of these fungi in soil is discussed. (Author)

AD-439 253 Div. 16
OTS price $1.10

Chiba Univ. (Japan).
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND CHEMOTHERAPY OF PARAGONIMIASIS (LUNG FLUKE DISEASE).
Semi-annual rept., 18 Apr-17 Oct 63,
by Muneo Yokogawa. 18 Oct 63, 8p.
Grant DA CRD AG S92 544 63G8
Unclassified report

Descriptors: (*Chemotherapy, Parasitic diseases), (*Parasitic diseases, Lungs), Effectiveness, Immunology, Japan, Antigen-antibody reactions, Diagnosis.

AD-439 254 Div. 16
OTS price $1.10

Chiba Univ. (Japan).
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS.
Quarterly rept., 1 Mar-31 May 62,
by Muneo Yokogawa. 1 May 62, 10p.
Contract DA92 557FEC35859
Unclassified report

Descriptors: (*Parasite diseases, Lungs), (*Chemo therapy, Parasitic diseases), Diagnosis, Japan, Immunology.

AD-439 255 Div. 16
OTS price $1.10

Chiba Univ. (Japan).
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS.
Quarterly rept., 1 June-31 Aug 62,
by Muneo Yokogawa. 1 Sep 62, 5p.
Contract DA92 557FEC35859
Unclassified report

Descriptors: (*Parasitic diseases, Lungs), (*Chemotheraphy, Parasitic diseases), Immunology, Diagnosis, Japan.

AD-439 270 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
PHYSIOCOCHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES.
Quarterly progress rept. no. 1, 15 Mar-14 June 62,
by Akira Inouye. 14 June 62, 8p.
Contract DA92 557FEC34753
Unclassified report

Descriptors: (*Medical research, Japan), (*Nucleic acids, Magnetic properties), Desoxyribonucleic acids, Ribonucleic acids, Electrons, Spin resonance, Magnetic properties, Ribosomes, Metabolism, Amino acids, Radioactive isotopes, Carbon.

AD-439 271 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES.
Quarterly progress rept. no. 2, 15 June-14 Sep 62,
by Adira Inouye. 14 Sep 62, 7p.
Contract DA92 557FEC34753
Unclassified report

Descriptors: (*Ribonucleic acid, Proteins), Brain, Microsomes, Japan, Chemistry, Biochemistry, Chemical analysis, Rabbits.

AD-439 272 Div. 16
OTS price $1.10

Kyoto Univ. (Japan)
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL

Division 16 - MEDICAL SCIENCES

AD-439 064 Div. 16
OTS price $1.10

Kanazawa Univ., Ishikawa (Japan).
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM.
Quarterly rept. no. 3, 15 July-14 Oct 62,
by Yasuyuki Takagi. 14 Oct 62, 5p.
Contract DA92 557FEC34525
Unclassified report

Descriptors: (*Deoxyribonucleic acid, Metabolism), Escherichia, Microorganisms, Biochemistry, Electrophoresis, Mutation, Synthesis, Genetics, Biological assay, Japan.

AD-439 065 Div. 16
OTS price $1.10

Jikei U., Tokyo (Japan).
GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIAL DNA.
Rept. no. 3, 20 July-19 Oct 62,
by Isamu Kondo. 19 Oct 62, 3p.
Contract DA92 557FEC35778
Unclassified report

Descriptors: (*Bacteriophages, Particles), (*Salmonella, Particles), Cells (Biology), Preparation, Desoxyribonucleic acids, Infections, Japan, Carbohydrates.

AD-439 066 Div. 16
OTS price $1.10

Jikei Univ., Tokyo (Japan).
GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIAL DNA.
Rept. no. 1, 20 Jan-20 Apr 62,
by Isamu Kondo. 20 Apr 62, 3p.
Contract DA92 557FEC35778
Unclassified report

Descriptors: (*Bacteriophages, Chemical analysis), (*Infections, Bacteriophages), Desoxyribonucleic acids, Salmonella, Adsorption, Japan, Particles.

AD-439 067 Div. 16
OTS price $1.10

Jikei Univ., Tokyo (Japan).
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY.
Semi-annual rept., 15 Nov 62-14 May 63,
by Fumikazu Takaki. 14 May 63, 5p.
Contract DA92 557FEC35699
Unclassified report

Descriptors: (*Cells (Biology), Pathology), Electron microscopy, Liver, Kidney, Heart, Histology, Rats, Toxins & antitoxins, Cytology.

AD-439 068 Div. 16
OTS price $1.10

Jikei Univ., Tokyo (Japan).
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY.
Quarterly rept. no. 2, 15 Feb-14 May 62,
by Fumikazu Takaki. 14 May 62, 5p.
Contract DA92 557FEC35699
Unclassified report

Descriptors: (*Cells (Biology), Toxins and antitoxins), Corynebacterium, Diseases, Vaccines, Rats, Glycogen, Liver, Toxicity, Japan, Kidneys, Blood vessels, Arteries, Electron microscopy, Neoplasms, Effectiveness.

AD-439 069 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
ON THE GROWTH MECHANISM OF PSITTACOSIS*TRACHOMA VIRUS IN TISSUE CULTURES.
Quarterly rept. 5 Aug-4 Nov 62,
by Noboru Higashi. 4 Nov 62, 2p.
Contract DA92 557FEC34501
Unclassified report

Descriptors: (*Chlamydia trachomatis, Cytology), Histology, Infectious diseases, Eye, Rickettsiales, Antibiotics, Nucleic acids, Growth, Japan.

AD-439 070 Div. 16
OTS price $1.10

Kyoto Univ., Kyoto (Japan).
PHYSICAL AND BIOCHEMICAL STUDIES ON THE MICROSOMES AND ITS NUCLEIC ACID.
Semiannual rept., 15 June-14 Dec 63,
by Akira Inouye. 14 Dec 63, 7p.
Contract DA92 557FEC36780
Unclassified report

Descriptors: (*Microsomes, Nucleic acid), (*Microsomes, Biochemistry), Mechanical properties, Liver, Purification, Brain, Ions, Magnesium, Medical examination, Electron microscopy, Microscopy, Nervous system, Physiology.

AD-439 071 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
GENETIC AND BIOCHEMICAL STUDIES ON THE CELL-FREE FORMATION OF TRYPTOPHAN SYNTHETASE IN ESCHERICHIA COLI.
Semi-annual rept., 20 Apr-19 Oct 63,
by Takashi Yura. 19 Oct 63, 3p.
Contract DA92 557FEC35949
Unclassified report

Descriptors: (*Escherichia, Biochemistry), (*Bacteria, Genetics), Tryptophan, Test methods.

AD-439 088 Div. 16
OTS price $1.60

Minnesota U., Minneapolis.
THORACIC CAGE IMPEDANCE MEASUREMENTS. IMPEDANCE PLETHYSMOGRAPHIC DETERMINATION OF CARDIAC OUTPUT (A COMPARATIVE STUDY),
by Edwin Kinnen, William Kubicek and R. Patterson.
Mar 64, 12p.
Contract AF41 657 403, Task 775801
SAM B TDR64 15 Unclassified report

Descriptors: (*Thorax, Cardiovascular system), (*Cardiovascular system, Throat), (*Throat, Electrical impedance), Impedance bridges, Blood volume, Electrodes, Experimental data, Oxygen consumption, Measurement.

Two band electrodes of tinned copper braid shielding 1 cm. wide were placed around the neck and thorax 2 cm. below the xiphisternal joint and connected to an electrical bridge circuit excited at 100 kc. The recorded change of impedance over a cardiac cycle was related

Based on the fine structure of the two typical invertebrate myocardium, studies were made on the relaxation of muscle through the anodal current stimulation. Ultramicroelectrode techniques and mechanical transducer were used to study the correlation between the anodal abolition of action potential and the relaxation in both stomatopod and molluscan hearts. The anodal current pulse of 100 msec duration given at one end of the myocardium resulted in a forced repolarization. The abolition of action potential is related to both the intensity of the anodal current and the phase of the plateau. This repolarization is accompanied by the inhibition of the development of tension, and is propagated throughout the rest of the heart. In oyster, lowering of the diastolic tension is noted by the application of the anodal current. The inhibition of spontaneous rhythmic contraction is also greatly influenced by the phase of the cardiac cycle, where the stimulation is applied, and is partly dependent on the intensity of the applied current. (Author)

AD-439 292 Div. 16
OTS price $1.10

Tokyo Metropolitan Ebara Infectious Disease Hospital (Japan).
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL INFECTIONS).
Quarterly rept., 1 Jan-31 Mar 62,
by Yasuzo Nakamizo. 31 Mar 62, 4p.
Contract DA92 557FEC35580
Unclassified report

Descriptors: (*Dysentery, Enterobacteriaceae), (*Shigella flexneri, Dysentery), (*Shigella sonnei, Dysentery), Enterobacteriaceae, Agglutinins, Blood serum, Mucus, Tests, Japan.

AD-439 293 Div. 16
OTS price $1.10

Tokyo Metropolitan Ebara Infectious Disease Hospital (Japan).
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS).
Quarterly rept., 1 Apr-30 Jun 62,
by Yasuzo Nakamizo. 30 Jun 62, 4p.
Contract DA92 557FEC35580
Unclassified report

Descriptors: (*Dysentery, Enterobacteriacae), (*Shigella flexneri, Dysentery), (*Salmonella typhosa, Dysentery), Diagnosis, Blood serum, Agglutinins, Antigen-antibody reactions, Pathology, Mucus, Japan.

Comparative studies of the agglutination, the hem-agglutination and the Latex agglutination on sera and mucus of Shigella flexneri 2a infected cases were performed. The Latex agglutination gave higher agglutinin titers than the agglutinin titers and the Latex titers were similar to the hem-agglutinin titers. Comparison of the agglutination and the Latex agglutination in typhoid fever patients sera showed that the Latex titers were higher than the agglutinin titers. Serological research of a Salmonella enteritidis infected case clarified that the Latex titer was higher than the agglutinin titer and similar to the hem-agglutinin titer. In this case mucus titer was low in three sero-reactions. (Author)

AD-439 294 Div. 16
OTS price $1.10

Tokyo Metropolitan Ebara Infectious Disease Hospital (Japan).
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS.
Quarterly rept., 1 Oct-31 Dec 62,
by Yasuzo Nakamizo. 31 Dec 62, 8p.
Contract DA92 557FEC35580
Unclassified report

Descriptors: (*Dysentery, Enterobacteriacea), (*Shigella flexneri, Dysentery), (*Salmonella, Dysentery), Mucus, Blood serum, Agglutinins, Pathology, Diagnosis, Antigen-antibody reactions.

Serological researches on serum and mucus in Shigellosis, Salmonellosis and other bacterial enteric infectious diseases during the period of 1 October 1962 through 31 December 1962 are summarized as follows: The cross Latex agglutination test Shigella flexneri v-x and Shigella flexneri v-y infected cases using both standard strains showed that the Latex agglutinin titers against Shigella flexneri v-y strain were higher than against Shigella flexneri v-x strain. The agglutinin titers of serum and mucus against Escherichia coli, E. aerogenes, Citrobacter, A. liquefaciens isolated from the feces of the gastroenteritis patients were mostly low except the agglutinin titer against A. liquefaciencs. The Latex agglutinin titers of serum and mucus against pathogenic halophilic vibrio-like bacilli were generally low in both serum and mucus. These strains were isolated from the feces of patients suffering from food-poisoning. (Author)

AD-439 295 Div. 16
OTS price $1.10

Tokyo Metropolitan Ebara Infectious Disease Hospital (Japan).
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS).
Quarterly rept., 1 Apr-30 Jun 63,
by Yasuzo Nakamizo. 30 Jun 63, 7p.
Contract DA92 557FEC35580
Unclassified report

Descriptors: (*Dysentery, Enterobacteriacea), (*Salmonella typhosa, Dysentery), (*Enterobacteriaceae, Dysentery), Escherichia coli, Diagnosis, Blood serum, Mucus, Agglutinins, Pathology, Viruses, Japan.

Agglutinin titers of serum and mucus against O-antigen and H-antigen of six entero-bacilli isolated from feces of acute gastro-enteritis patients were very low. Although clinical figures of these cases were similar to bacillary dysentery, no Shigella strain isolated. Comparative study of agglutinin titers between the Widal test and the Latex Widal test in sera of twenty-one cases of typhoid fever patients was carried out. The Latex agglutinin titers were higher than the Widal agglutinin titers in both agglutinin titers against Vi-antigen or O-antigen of Salmonella typhi. Influences of three solutions (0.5% saline, 0.85% saline, glycine saline buffer Difco) and Latex solution upon agglutinin titer of rabbit anti-Salmonella typhi serum and antigenicity of O-antigen of Salmonella typhi were studied. It was clarified that glycine saline buffer Difco is most suitable to detection of O-agglutinin of anti-O serum. (Author)

RIBONUCLEOPROTEIN PARTICLES.
Rept. no. 3, 15 Sep-14 Dec 62,
by Akira Inouye. 14 Dec 62, 7p.
Contract DA92 557FEC34753
Unclassified report

Descriptors: (*Ribonucleic acid, Proteins), Chemistry, Microsomes, Japan, Particles, Chemical analysis, Biochemistry, Brain, Distribution, Neurology.

AD-439 273 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
ON THE GROWTH MECHANISM OF PSITTACOSIS-TRACHOMA VIRUSES IN TISSUE CULTURE.
Quarterly rept. 5 Feb-4 May 62,
by Noboru Higashi. 4 May 62, 2p.
Contract DA92 557FEC34501
Unclassified report

Descriptors: (*Viruses, Birds), Growth, Tissue culture, Japan, Embryonated egg technique, Pathology, Cytology, Infections, Cells (Biology).

AD-439 274 Div. 16
OTS price $1.10

Kyoto Univ. (Japan).
METABOLIC FUNCTION OF DEOXYNUCLEOSIDIC COMPOUNDS.
Quarterly rept. 1 Apr-30 June 62,
by Osamu Hayaishi. 30 June 62, 6p.
Contract DA92 557FEC35976
Unclassified report

Descriptors: (*Desoxyribonucleic acid, Metabolism), Synthesis, Cells (Biology), Determination, Rats, Liver, Streptomyces, Antibiotics, Chromatographic analysis.

AD-439 277 Div. 16
OTS price $1.60

Hokkaido Univ., Sapporo (Japan).
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS.
Final rept. 15 Dec 61-14 Dec 62,
by Sajiro Makino. 14 Dec 62, 17p.
Contract DA92 557FEC34462
Unclassified report

Descriptors: (*Radiation effects, Cell division), (*Cell division, Radiation effects), Morphology (Biology), Chromosomes, Japan, X rays, Invertebrates, Radioprotective agents, Mammals, Humans, Mice, Embryos, Sensitivity, Drosophila, Reproduction (Physiology), Paramecium.

AD-439 278 Div. 16
OTS price $1.10

Hokkaido Univ., Sapporo (Japan).
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS.
Quarterly rept. 15 June-14 Sep 62,
by Sajiro Makino. 14 Sep 62, 8p.
Contract DA92 557FEC34462
Unclassified report

Descriptors: (*Radiation effects, Cell division), Mice, Chromosomes, X-rays, Morphology (Biology), Mammals, Cells (Biology), Invertebrates, Genetics, Paramecium, Tissue culture, Lungs, Gamma rays, Humans.

AD-439 282 Div. 16
OTS price $1.10

Chiba U. (Japan).
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS.
Quarterly rept. 1 Sep-30 Nov 62,
by Muneo Yokogawa. 30 Nov 62, 7p.
Contract DA92 557FEC35859
Unclassified report

Descriptors: (*Parasites, Infections), Therapy, Larvae, Effectiveness, Japan, Antibiotic.

AD-439 283 Div. 16
OTS price $1.10

Hiroshima Univ. (Japan).
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION.
Quarterly rept. 16 Dec 61-15 Mar 62,
by Hiroshi Irisawa. 15 Mar 62, 4p.
Contract DA92 557FEC34980
Unclassified report

Descriptors: (*Muscles, Relaxation (Physiology)), Guinea pigs, Stimulation, Aquatic animals, Invertebrates, Nervous system, Heart, Analysis, Chemistry.

AD-439 284 Div. 16
OTS price $1.10

Hiroshima U. (Japan).
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION.
Quarterly rept., 16 Jun-14 Sep 62,
by Hiroshi Irisawa. 14 Sep 62, 3p.
Contract DA92 557FEC34980
Unclassified report

Descriptors: (*Muscles, Relaxation (Physiology)), Stimulation, Cats, Calcium, Ions, Theory, Sodium, Excitation, Thresholds (Physiology), Potassium, Barium.

AD-439 285 Div. 16
OTS price $1.10

Hiroshima Univ. (Japan).
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION.
Quarterly rept., 15 Sep-14 Dec 62,
by Hiroshi Irisawa. 14 Dec 62, 3p.
Contract DA92 557FEC34980
Unclassified report

Descriptors: (*Muscles, Voltage), Physiology, Tissues (Biology), Urinary system, Ions, Sodium, Electrolytes (Physiology), Cats, Electric currents, Stimulation.

AD-439 286 Div. 16
OTS price $5.60

Hiroshima Univ. (Japan).
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION.
Final rept., 15 June 61-14 June 62,
by Hiroshi Irisawa. 14 June 62, 51p.
Contract DA92 557FEC34980
Unclassified report

Descriptors: (*Muscles, Relaxation (Physiology)), Stimulation, Mollusca, Invertebrates, Heart, Inhibition, Mammals, Analysis, Crustacea.

AD-439 307 Div. 16
OTS price $1.10

Tohoku Univ. (Japan).
EXPERIMENTAL STUDIES OF THE EFFECT OF CALCIUM DIFECIENT DIET TO THE ARTERIAL WALL AND OTHER TISSURES WITH SPECIAL REFERENCE TO CEREBROVASCULAR DISEASES.
Quarterly rept. 1 Sep-30 Nov 62,
by Eiji Takahashi. 30 Nov 62, 5p.
Contract DA92 557FEC36053
Unclassified report

Descriptors: (*Medical research, Japan), (*Nutrition, Deficiency diseases), Calcium, Diet, Laboratory animals, Rats, Body weight, Survival, Metabolism, Chemical analysis.

AD-439 308 Div. 16
OTS price $1.10

Tohoku U. (Japan).
EXPERIMENTAL STUDIES OF THE EFFECT OF CALCIUM DEFICIENT DIET TO THE ARTERIAL WALL AND OTHER TISSUES WITH SPECIAL REFERENCE TO CEREBROVASCULAR DISEASES.
Semiannual rept., 1 Jun-30 Nov 63,
by Eiji Takahashi. 30 Nov 63, 6p.
Contract DA92 557FEC36053
Unclassified report

Descriptors: (*Calcium, Diet), (*Brain, Diseases), Potassium, Rats, Body weight, Determination, Japan, Metabolism, Adaptation (Physiology), Blood pressure, Nuclei (Biology), Mitochondria, Microsomes, Arteries, Magnesium, Sodium.

AD-439 309 Div. 16
OTS price $1.10

Kitasato Inst. (Japan).
EXPLORATION OF NEW CHEMOTHERAPEUTICS FOR INFECTIOUS DISEASES.
Semi-annual rept., 20 Mar-19 Sep 63,
by Toju Hata. 19 Sep 63, 3p.
Grant CRD AG S92 544 63 G5
Unclassified report

Descriptors: (*Chemotherapeutic agents, Infections), Diseases, Japan, Streptomyces, Chemical properties, Antibotics, Pathology, Microorganisms, Japanese B encephalitis virus.

Protomycin, a new antiamaebic substance was producted by a new strain Sterptomyces reticuli var. protomycicus, was determined chemical properties and structure. Next subjects are planted the mass production of Protonycin, subsequently treated amaebic patients with it. As a new other antibacterial and antifungal sustance was fund in this Streptomyces cultural media the substance was tried to purify and crystallize at the present time. Finally a antibacterial substance was crystallized as a colorless needle crystaline substance. Antimicrobial activity of this crystaline substance: The minimal inhibitory concentration of the substance was 1 mcg/ml - 1,000 mcg/ml to gram positive bacteria, but this dis not show inhibitory effects to gram negative bacteria. (Author)

AD-439 310 Div. 16
OTS price $1.10

Kitasato Inst. (Japan).
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
Quarterly rept. no. 1, 1 Nov 61-31 Jan 62,
by Katsuhiko Tago. 31 Jan 62, 8p.
Contract DA92 557FEC35673
Unclassified report

Descriptors: (*Antibiotics, Biochemistry), Effectiveness, Japan, Streptomyces, Staphylococcus, Analysis, Synthesis, Proteins, Inhibition, Salmonella, Shigella, Klebsiella, Diplococcus, Streptococcus, Staphlococcus.

AD-439 311 Div. 16
OTS price $1.10

Kitasato Inst. (Japan).
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
Quarterly rept. no. 2, 1 Feb-31 Apr 62,
by Katsuhiko Tago. 31 Apr 62, 7p.
Contract DA92 557FEC35673
Unclassified report

Descriptors: (*Antibiotics, Staphylococcus), (*Staphylococcus, Antibiotics), Inhibition, Radioactive isotopes, Japan, Effectiveness, Carbon, Adenine, Microorganism.

AD-439 312 Div. 16
OTS price $1.10

Kitasato Inst. (Japan).
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
Quarterly rept. no. 3, 1 May-31 Jul 62,
by Katsuhiko Tago. 31 Jul 62, 9p.
Contract DA92 557FEC35673
Unclassified report

Descriptors: (*Quinolines, Germicides), (*Germicides, Quinolines), Synthesis (Chemistry), Oximes, Antitubercular agents, Toxicity, Mice, Effectiveness, Streptomycins, Staphylococcus aureus, Escherichia coli, Growth, Ethylenedinitrilo tetracetates, Cobalt, Chemotherapeutic agents, Alcohol, Japan.

AD-439 313 Div. 16
OTS price $1.60

Kitasato Inst. (Japan).
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
Semi-annual rept. no. 1, 1 Nov 62-30 Apr 63,
by Katsuhiko Tago. 30 Apr 63, 12p.
Contract DA92 557FEC35673
Unclassified report

Descriptors: (*Antibiotics, Staphylococcus aureus). (*Medical research, Japan). Radioactive isotopes, Tracer studies, Carbon, Escherichiacoli, Streptomyces.

AD-439 316 Div. 16
OTS price $1.10

Kitasato Inst. (Japan).
EXPLORATION OF NEW CHEMOTHERAPEUTICS FOR INFECTIOUS DISEASES.
Quarterly rept. no. 3, 1 May-31 Jul 62,
by Toju Hata. 31 Jul 62, 6p.
Contract DA92 557FEC35675
Unclassified report

Descriptors: (*Chemotherapeutic agents, Molecular structure), (*Antibiotics, Molecular structure), Chemical analysis, Japan.

AD-439 317 Div. 16
OTS price $1.10

Kumamoto U. (Japan).
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM

AD-439 296 Div. 16
OTS price $2.60

Tokyo National Chest Hospital (Japan).
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM.
Semiannual rept., 28 Mar-27 Sep 63,
by Shigeichi Sunahara. 27 Sep 63, 27p.
Grant CRD AG S92 544 63G3
Unclassified report

Descriptors: (*Medical research, Japan), (*Biochemistry, Genetics), (*Drugs, Metabolism), Isoniazid, Adenosine phosphates, Coenzymes, Liver, Amines, Benzoic acids, Urine, Chemical analysis, Laboratory animals, Primates, Rabbits, Pigeons, Chickens, Rats, Mice, Guinea pigs, Chemotherapeutic agents.

AD-439 297 Div. 16
OTS price $1.60

Tokyo National Chest Hospital (Japan).
BIOCHEMICAL AND GENETICAL STUDIES OF INH METABOLISM.
Quarterly rept. no. 1, 1 Jan-31 Mar 62,
by Shigeichi Sunahara. 31 Mar 62, 18p.
Contract DA92 557FEC35752
Unclassified report

Descriptors: (*Metabolism, Biochemistry), (*Genetics, Metabolism), Theory, Drugs, Tissue (Biology), Tables, Sociology, Acetylation, Tables.

AD-439 298 Div. 16
OTS price $3.60

Tokyo National Chest Hospital (Japan).
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM.
Quarterly rept. no. 2, 1 Jan-31 Dec 62,
by Shigeichi Sunahara. 31 Dec 62, 32p.
Contract DA92 557FEC35752
Unclassified report

Descriptors: (*Medical research, Japan), (*Biochemistry, Genetics), (*Metabolism, Isoniazid), Diseases, Mycobacterium tuberculosis, Antitubercular agents, Saliva, Medical examination, Lungs, X-ray photography.

AD-439 299 Div. 16
OTS price $1.60

Tokyo National Chest Hospital (Japan).
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM.
Quarterly rept. no. 3, 1 July-30 Sep 62,
by Shigeichi Sunahara. 30 Sep 62, 14p.
Contract DA92 557FEC35752
Unclassified report

Descriptors: (*Medical research, Japan), (*Metabolism, Drugs), Isoniazid, Amines, Benzoic acids, Tissues (Biology), Oxidation, Liver, Laboratory animals, Chickens, Genetics, Chemotherapeutic agents.

AD-439 300 Div. 16, 20
OTS price $1.10

Yokohama City Univ. (Japan).
THE EFFECT OF COBALT-60 GAMMA RADIATION ON THE CENTRAL NERVOUS SYSTEM.
Semi-annual rept., 7 May-6 Nov 63,
by Akira Tsuya. 6 Nov 63, 7p.
Grant DA CRD AG S92 544 63G13
Unclassified report

Descriptors: (*Central nervous system, Radiation effects), Gamma rays, Cobalt, Pathology, Head, Electro encephalography, Brain, Cells (Biology), Rodents, Dosage, Pituitary gland, Gamma emission.

The effect of Cobalt-60 gamma radiation on the central nervous system was studied electroencephalographically on the unstrained and unanesthetized rabbits. The phenomena of elevated threshold for inducing EEG afterreaction was observed as low as 100r after whole head single irradiation, and its degree and recovering process was found highly dose-dependent. Further investigation for lower doses less than 100r is being conducted. (Author)

AD-439 303 Div. 16
OTS price $1.10

Tokyo Dental Coll. (Japan).
STUDY ON THE INTRACELLULAR CALCIFICATION BY ORAL LEPTOTRICHIA.
Quarterly rept. 1 May-31 July 62,
by Waichi Yonezawa. 31 July 62, 6p.
Contract DA92 557FEC35975
Unclassified report

Descriptors: (*Medical research, Japan), (*Metabolism, Calcification), Calcium, Phosphorus, Bacteria, Mouth, Calculi, Phosphoric monoester hydrolases.

AD-439 304 Div. 16
OTS price $1.10

Tokyo Dental Coll. (Japan)
STUDY ON THE INTRACELLULAR CALCIFICATION BY ORAL LEPTOTRICHIA.
Quarterly rept. 1 Aug-31 Oct 62,
by Waichi Yonezawa. 31 Oct 62, 7p.
Contract DA92 557FEC35975
Unclassified report

Descriptors: (*Medical research, Japan), (*Metabolism, Calcification), Calcium, Phosphorus, Calcium compounds, Phosphates, Fluorides, Chlorides, Crystal growth, Nucleation, Bacteria, Mouth.

AD-439 305 Div. 16
OTS price $1.60

Tokyo Dental Coll. (Japan).
STUDY ON THE INTRACELLULAR CALCIFICATION BY ORAL LEPTOTRICHIA.
Semiannual rept. 26 June-25 Dec 63,
by Waichi Yonezawa. 25 Dec 63, 11p.
Grant DA GRD AG S92 544 63G14
Unclassified report

Descriptors: (*Medical research, Japan), (*Metabolism, Calcification), Bacteria, Calcium, Phosphorus, Polysaccharides, Fluorine, Mouth.

AD-439 306 Div. 16
OTS price $1.10

Tokyo Municipal Komagome Hospital (Japan).
THE STUDY ON THE PATHOGENESIS OF BACILLARY DYSENTERY.
Semiannual rept., 27 Mar-26 Sep 63,
by Kazumine Kobari. 26 Sep 63, 8p.
Grant DA CRD AG S92 544 63G7
Unclassified report

Descriptors: (*Medical research, Japan), (*Digestive system diseases, Dysentery), Bacteria, Diagnosis, Excretion, Diarrhea, Chloramphenicol.

Descriptors: (*Throat, Skin), Frequency, Muscles, Tissue (Biology), Electrodes, Resistance (Electrical), Dogs, Geometry.

Average volume resistivities for thoracic tissues at an exciting frequency of 100 kc. are required for studies of the current flux paths in transthoracic impedance plethysmography. By using a uniquely designed probe and anesthetized dogs, an average tissue resistivity was found for skeletal muscle to be approximately 400 ohm cm; heart muscle, 450 ohm cm; lung tissue, 1,200 to 1,500 ohm cm; kidney and liver, 600 ohm cm; fat, 1,000 to 2,000 ohm cm; and for whole canine blood, 150 ohm cm at a hematocrit of 45. With the exception of whole blood, all values varied significantly between dogs and between individual readings. The values for lung and liver tissues and for fat were noted to have particularly large variations between readings and between animals. Canine skeletal muscle tissue had a linear electrical resistivity characteristic for excitation current densities up to 80 ma./sq cm. Representative normal, human skin on the bicepts was shown to contribute approximately 4.5 x 10 to the minus 3rd power of electrode surface area in series with the transthoracic impedance, with possible modifications required for electrode geometry and electrode paste. (Author)

AD-439 381 Div. 16
OTS price $3.60

Bolt Beranek and Newman, Inc., Cambridge, Mass.
NEURAL MECHANISMS FOR RESPONSES OF MIDDLE EAR MUSCLES.
Final rept., 1 Jan 62-31 Dec 63,
by William D. Neff, P. C. Nieder, N. L. Strominger, A. Adolph and S. Hall. 31 Dec 63, 34p. Rept. no. 1128
Contract DA49 193md2230
Unclassified report

Descriptors: (*Ear, Muscles), (*Muscles, Nerve cells), (*Symposia, Ear), Conditioned reflex, Nervous system, Laboratory animals, Experimental data, Sound, Stimulation, Control.

AD-439 502 Div. 16, 15, 30
OTS price $2.60

Naval School of Aviation Medicine, Pensacola, Fla.
SIGNIFICANT PHYSIOLOGICAL PARAMETERS OF THE BALLISTOCARDIOGRAM AS ANALYZED BY A MATHEMATICAL MODEL,
by Robert L. Morse. 8 Jan 64, 22p.
NAVMED MR005 13 17004 11
Unclassified report

Descriptors: (*Ballistocardiography, Analysis), Computers, Mathematical models, Humans, Arteries, Blood vessels, Blood pressure, Heart, Determination.

The human acceleration ballistocardiogram is a complex resultant of numerous physiological parameters. Identification of these parameters is important to a better understanding of the BCG. The use of a mathematical model and a digital computer provides an approach to this problem. The slope of the arterial pulse wave and the elasticity of the arterial system appear to be important parameters of the H and J wave amplitude. The K wave seems to be dependent upon the shape of the pulse wave which is generated between peak systolic pressure and semilunar closure. It is recommended that blood pressure, heart sounds, and some estimate of arterial elasticity be recorded during ballistocardiographic determinations, since these parameters contribute to the physiological interpretation of the ballistocardiogram, which is illustrated in this report. (Author)

AD-439 639 Div. 16
OTS price $1.60

National Taiwan Univ., Taipei, (China).
SEASONAL VARIATIONS IN THE INCIDENCE OF PARAGONIMUS WESTERMANI INFECTION IN ERIOCHEIR JAPONICUS.
Annual progress rept., 1 Feb 63-31 Jan 64,
by Wen-Hsien Huang. 31 Jan 64, 9p.
Grant DA MD49 193 63G103
Unclassified report

Descriptors: (*Trematodes, Periodic variations), (*Periodic variations, Trematodes), Life cycle, Disease vectors, Crustacea, Infections, Epimemiology, Taiwan, Ecology, Experimental data, Parasites.

This report discusses (1) whether or not the incidence of Paragonimus infection in Eriocheir crabs had a seasonal Variation, (2) if there was any relationship between the incidence of infection and the size of the crab. The results showed that: the incidence of infection showed two peaks, i. e., one in February-March (early spring) and the other in August-September (late summer to early autumn). The incidence of 49.0% in September is the highest. Regarding the intensity of infection in the crabs, no noticeable seasonal pattern was found. But the intensity was greater in September to November. Both the incidence and intensity of infection steadily increased with the size of the crab. The incidence of infection in Eriocheir crabs not only showed seasonal fluctuations, but also simultaneously increased with the size of the crab. (Author)

AD-439 643 Div. 16
OTS price $1.60

National Taiwan Univ., Taipei, (China).
AN EPIDEMIOLOGIC SURVEY OF PARAGONIMUS WESTERMANI (KERBERT, 1878) AND RELATED SPECIES IN TAIPEI COUNTY, TAIWAN.
Annual progress rept., 1 Feb 61-31 Jan 64,
by Wen-Hsien Huang. 31 Jan 64, 14p.
Grant DA MD49 193 63G103
Unclassified report

Descriptors: (*Trematodes, Epidemiology), (*Parasites, Public Health), Identification, Disease vectors, Crustacea, Taiwan, Life cycle, Experimental data, Marine biology, Diagnostic agents.

The distribution of the flukes of the genus Paragonimus in Taipei county, Taiwan, was made by random collection and examination of the crab hosts. A total of 18,538 fresh- and brackish-water crabs including 16 species collected from 121 villages was examined. Two species of Paragonimus metacercariae were found. The incidence of P. westermani in Eriocheir crabs varied with the locality where the crabs collected, ranging from 0% to 89.6%. Even at the same endemic area, the incidence of infection in Eriocheir crabs varied with stream and also with part of stream. Intradermal tests using antigen made from adult P. westermani have been carrying out on the school children living in the endemic areas. (Author)

AD-439 666 Div. 16
OTS price $1.10

School of Aerospace Medicine, Brooks AFB, Tex.
HEMATOLOGIC CHANGES FOLLOWING SIMPLE EXODONTIA,

ANIMAL TISSUES.
Quarterly rept. no. 1, 1 Feb-30 Apr 62,
by Hideo Hayashi. 30 Apr 62, 2p.
Contract DA92 557FEC35779
Unclassified report

Descriptors: (*Medical research, Japan). (*Enzymes, Inhibition). Peptide hydrolases, Inflammation, Sensitivity, Therapy, Papain, Thiols, Volumetric analysis.

AD-439 318 Div. 16
OTS price $1.10

Kumamoto U. (Japan).
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES.
Quarterly rept. no. 2, 1 May-31 Jul 62,
by Hideo Hayashi. 31 Jul 62, 3p.
Contract DA92 557FEC35779
Unclassified report

Descriptors: (*Medical research, Japan), (*Enzymes, Inhibition), Purification, Chromatographic analysis, Peptide hydrolases, Papain, Sensitivity, Capillaries, Permeability, Laboratory animals, Rabbits.

AD-439 319 Div. 16
OTS price $1.10

Kumamoto Univ. (Japan).
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES.
Quarterly rept. no. 3, 1 Aug-31 Oct 62,
by Hideo Hayashi. 31 Oct 62, 3p.
Contract DA92 557FEC35779
Unclassified report

Descriptors: (*Medical research, Japan), (*Enzymes, Inhibition), Peptide hydrolases, Therapy, Sensitivity, Connective tissue, Capillaries, Permeability, Globulins, Laboratory animals, Guinea pigs, Antigen-Antibody reactions.

AD-439 320 Div. 16
OTS price $1.10

Kumamoto Univ. (Japan).
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES.
Semiannual rept., 1 Feb-31 Jul 63,
by Hideo Hayashi. 31 Jul 63, 3p.
Contract DA92 557FEC35779
Unclassified report

Descriptors: (*Medical research, Japan), (*Enzymes, Inhibition), Peptide hydrolases, Purification, Electrophoresis, Sensitivity, Therapy, Papain, Thiols, PH.

AD-439 321 Div. 16
OTS price $1.10

National Inst. of Health, Tokyo (Japan).
THE EXPLANATION OF PATHOGENESIS OF JBE VIRUS AND THE ESTABLISHMENT OF AN ATTENUATED STRAIN OF JBE VIRUS COMPLETELY AVIRULENT TO MAN.
Quarterly rept. no. 1, 1 Feb-30 Apr 62,
by Akira Oya. 30 Apr 62, 7p.
Contract DA92 557FEC35805
Unclassified report

Descriptors: (*Japanese B encephalitis virus, Pathology), Immunology, Attenuation, Antigen-antibody reactions, Fluorescence, Tracer studies, Immune serums, Hamsters, Kidneys, Cells (Biology), Culture media, Histology, Genetics, Japan, Biological stains, Photographs.

AD-439 322 Div. 16
OTS price $1.10

National Inst. of Health, Tokyo (Japan).
THE EXPLANATION OF PATHOGENESIS OF JBE VIRUS AND THE ESTABLISHMENT OF AN ATTENUATED STRAIN OF JBE VIRUS COMPLETELY AVIRULENT TO MAN.
Quarterly rept. no. 2, 1 May-31 July 62,
by Akira Oya. 31 July 62, 7p.
Contract DA92 557FEC35805
Unclassified report

Descriptors: (*Japanese B encephalitis virus, Pathology), Immunology, Attenuation, Antigen-antibody reactions, Fluorescence, Tracer studies, Cytology, Hamsters, Kidneys, Cells (Biology), Culture media, Histology, Japan, Genetics, Biological stains, Photographs.

AD-439 323 Div. 16
OTS price $1.60

Sasaki Foundation Medical Institution, Kanda, (Japan).
HETEROGENEITY OF CANCER CELL POPULATION WITH REGARD TO THE NATURAL DRUG RESISTANCE OF CANCER CELL.
Semi-annual rept. 28 May-27 Nov 63,
by Tomizo Yoshida. 27 Nov 63, 19p.
Grant CRD AG S92 544 63G6
Unclassified report

Descriptors: (*Neoplasms, Therapy), Chromosomes, Cells (Biology), Drugs, Japan, Distribution.

AD-439 324 Div. 16
OTS price $1.10

Sasaki Foundation Medical Institution, Kanda (Japan).
HETEROGENEITY OF CANCER CELL POPULATION WITH REGARD TO THE NATURAL DRUG RESISTANCE OF CANCER CELL.
Progress rept., 1 Apr-30 June 62,
by Tomizo Yoshida. 30 June 62, 2p.
Contract DA92 557FEC35765
Unclassified report

Descriptors: (*Neoplasms, Therapy), Cells (Biology), Japan, Effectiveness, Drugs.

AD-439 325 Div. 16
OTS price $1.10

Sasaki Foundation Medical Institution, Kanda (Japan).
HETEROGENEITY OF CANCER CELL POPULATION WITH REGARD TO THE NATURAL DRUG RESISTANCE OF CANCER CELL.
Progress rept., 1 July-30 Sep 62,
by Tomizo Yoshida. 30 Sep 62, 2p.
Contract DA92 557FEC35765
Unclassified report

Descriptors: (*Neoplasms, Therapy), Rats, Transplantation, Cells (Biology), Japan.

AD-439 353 Div. 16
OTS price $1.60

Minnesota Univ., Minneapolis.
THORACIC CAGE IMPEDANCE MEASUREMENTS. TISSUE RESISTIVITY IN VIVO AND TRANSTHORACIC IMPEDANCE AT 100 kc,
by Edwin Kinnen, William Kubicek, P. Hill and G. Turton. Mar 64, 18p.
Contract AF41 657 403, Task 775801
SAM B TDR64 5 Unclassified report

The 0.0046-in. diameter, as-drawn, beryllium wire can be chemical-milled to sizes near 0.0010-in. diameter which show dimensional uniformity and good surface quality. A continuous trend toward higher strength with decreasing diameter of the wire was noted, and it appears possible that ultrafine wire with strength approaching the 200,000 psi level can be produced with consistency. A good degree of ductility was noted in wire chemical-milled below 0.0025-in. diameter as evident in necking of specimens; although, this ductility did not appear in tensile elongation values. Fracture strengths in wire showing ductile fractures reached values near 220,000 psi. (Author)

AD-438 718 Div. 17, 14, 25
OTS price $11.00

Martin Marietta Corp., Denver, Colo.
CRYOGENIC MATERIALS DATA HANDBOOK.
Progress rept. no. 14, Semiannual progress rept. no. 3,
by F. R. Schwartzberg, S. H. Osgood, R. D. Keys and T. F. Kiefer. 15 Jan 64, 141p.
Contract AF33 657 9161, Proj. 7381, Task 738103
Unclassified report

Also available from OTS as PB 171809-6.

Descriptors: (*Handbooks, Cryogenics), (*Cryogenics, Materials), Aluminum alloys, Cobalt alloys, Copper alloys, Iron alloys, Nickel alloys, Titanium alloys, Carbides, Titanium compounds, Tungsten compounds, Ice, Polyester plastics, Halocarbon plastics, Nylon, Epoxy plastics, Laminated plastics, Glass textiles, Silicone plastics, Beryllium, Molybdenum, Mechanical properties, Physical properties, Data, Compressive properties, Electrical properties, Magnetic properties, Thermal properties.

AD-438 777 Div. 17, 26
OTS price $1.60

Allegheny Ludlum Steel Corp., Brackenridge, Pa.
TANTALUM ALLOY TUBING DEVELOPMENT PROGRAM.
Interim technical engineering rept. no. 3, 1 Jan-15 Apr 64,
by F. S. Turner. Apr 64, 16p.
Contract AF33 657 11261, Proj. 8 109
RTD TR8 109, vol. 3
Unclassified report

Descriptors: (*Tantalum alloys, Pipes), (*Pipes, Tantalum alloys), Material forming, Manufacturing methods, Extrusion, Carbon alloys, Hafnium alloys, Tungsten alloys, Machine tools, Design, Dies, Mandrels, Refractory coatings, Zirconium compounds, Oxides.

Efforts were devoted to material procurement and to tooling design and manufacture. (Author)

AD-438 779 Div. 17
OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL EVALUATION OF D6ac STEEL EXTRUSION - MECHANICAL AND METALLURGICAL PROPERTIES OF,
by W. M. Pratt. 15 Apr 64, 15p. Rept. no. FTDM3234
Unclassified report

Descriptors: (*Steel, Mechanical properties), (*Extrusion, Steel), Tensile properties, Metallography, Heat treatment, Hardness, Ductility, Grain structures (Metallurgy).

Relatively uniform smooth tensile properties were obtained for the D6ac steel heat treated to 220-240 KSI regardless of grain directionality or location in the extrusion. The ductility was somewhat lower in the transverse direction. At the 260-290 KSI strength level the junction of legs of the extrusion displayed the highest ultimate strength. While the ultimate tensile strengths of the two legs were comparable for both the transverse and longitudinal directions, higher yield strength and lower ductility were obtained for the transverse grain direction. The notch tensile strength of the extrusion in the longitudinal grain direction was equal to or slightly greater than the ultimate strength for both hea/treat levels. For the transverse grain direction the notch tensile strength was equal to or slightly less than the ultimate strength. The notch strength obtained for the extrusion was less than that obtained for D6ac plate and forging at the corresponding strength levels. (Author)

AD-438 815 Div. 17, 26
OTS price $17.50

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME I. FORGING OF FRONT AND REAR CLOSURES.
Final technical rept., 30 June 60-30 Sep 63,
by L. Godfrey and R. Makowski. 31 Oct 63, 271p.
Rept. no. 2267
Contract DA19 0200RD5230, Projs. TB4 004, 5B93 32 004
WAL TR766 2 1 14 Unclassified report

Descriptors: (*Rocket cases, Titanium alloys), (*Titanium alloys, Rocket cases), Forging, Aluminum alloys, Chromium alloys, Vanadium alloys, Heat treatment, Ductility, Oxygen, Aging (Materials), Rupture, Tensile properties, Material forming, Grain structure (Metallurgy).

Subscale and full scale rocket motor case closures were forged to develop economical fabrication techniques which would produce forgings with consistently high strength levels. Forgings were intended to meet a design requirement of a 180,000 psi minimum yield strength level with 4% minimum elongation. Initial evaluation of the effects of oxygen indicated that contents between 0.11 and 0.17 weight per cent were acceptable. Evaluation of full scale forgings indicated, however, that parts with oxygen contents below 0.12% were not capable of attaining the 180,000 to 200,000 psi yield strength level throughout with adequate ductility, and therefore it is recommended that forgings of B-120 VCA titanium alloy contain a minimum of 0.12, a maximum of 0.17, and a nominal 0.14 weight per cent oxygen. The maximum value was established on the basis of ductility deterioration. (Author)

AD-438 875 Div. 17
OTS price $1.60

IIT Research Inst., Chicago, Ill.
VANADIUM ALLOY STUDIES.
Bimonthly rept. no. 1, 1 Feb-31 Mar 64,
by D. Weinstein and F. C. Holtz. 16 Apr 64, 14p.
Rept. no. B6021 1
Contract NOw64 0239c
Unclassified report

Descriptors: (*Vanadium alloys, Mechanical properties), (*Niobium alloys, Vanadium alloys), Creep, Stresses, Rupture, Titanium alloys, Molybdenum alloys, Tantalum alloys, Tungsten alloys, Heat treatment, Hardness, Grain structures (Metallurgy), High-temperature research, Low-pressure research.

Vanadium development studies described herein have the primary objective of producing improved short-time (15-min to at least 1-hr) creep and

by Ira L. Shannon, Edward E. Davis, William A. Gibson. Nov 63, 10p.
Task 775602
SAM B TDR63 82 Unclassified report

Descriptors: (*Dentistry, Hematology), (*Stress (Physiology), Dentistry), Analysis of variance, Adrenocorticotropic hormones, Steroids, Lymphocytes, Erythrocytes, Hematocrit, Hemoglobin.

Hematologic studies were carried out on 90 systemically healthy, young adult males, some of whom underwent a simple exodontic experience. In one experiment blood samples were collected before and at 2- and 4-day intervals after tooth removal. In another, blood was drawn prior to and at 4 hours after exodontia. In the 4-hour study significant changes following extraction were noted for white blood cells, neutrophils, lymphocytes, hematocrit, and corrected sedimentation rate. Only the latter factor was found to change significantly in the 4-day study. These results are held to be related to the previously established adrenocortical hyperactivity in patients undergoing comparable dental procedures. (Author)

AD-439 674 Div. 16
OTS price $1.10

Hammersmith Hospital, London (England).
FACTORS MODIFYING THE ACTION OF NEUROMUSCULAR BLOCKING AGENTS.
Quarterly technical status rept. no. 3, 1 Oct-31 Dec 63,
by J. P. Payne. 31 Dec 63, 8p.
Contract DA91 591EUC2881
Unclassified report

Descriptors: (*Muscles, Inhibition), (*Neuromuscular transmission, Drugs), Neurology, Stimulation, Rats, Excitation, PH, Relaxation (Physiology).

17. METALLURGY

AD-437 965 Div. 17
OTS price $2.60

Aerojet-General Corp., Azusa, Calif.
STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Quarterly progress rept. no. 12, 1 Jan-31 Mar 64,
by R. B. Setterlund. Apr 64, 28p. Rept. no. 0414 02 3Q
Contract DA04 4950RD3069
Unclassified report

Descriptors: (*Steel, Fracture (Mechanics)), (*Stresses, Corrosion), Maraging steel, Nickel alloys, Martensite, High-temperature research, Failure (Mechanics), Test methods, Metallurgy, Plastic coatings, Isocyanate plastics, Zinc coatings, Epoxy plastics, Coatings, Data.

The objectives of the program are to (1) study the stress-corrosion characteristics of 18%-nickel maraging steel with respect to compositional variation; (2) study the effect of environmental temperature on the rate of stress-corrosion cracking in 18%-nickel maraging steel, a low-alloy martensitic steel, and a hot-worked die steel; (3) study the electropotential changes occurring in 18%-nickel maraging steel during stress-corrosion exposure and the effect of applied potential; and (4) evaluate the effectiveness and applicability of surface protection on 18%-nickel maraging steel in preventing stress-corrosion cracking. (Author)

AD-438 138 Div. 17
OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL BERYLLIUM WAFFLE PANEL. CHEMICAL MILLED, SHEAR TEST OF,
by J. May. 15 Apr 64, 13p. Rept. no. FTDM 3068
Unclassified report

Descriptors: (*Beryllium, Panels (Structural)), (*Panels (Structural), Beryllium), Chemical milling, Shear stresses, Loading (Mechanics), Strain (Mechanics).

AD-438 142 Div. 17
OTS price $1.10

General Dynamics/Fort Worth, Tex.
MECHANICAL PROPERTIES OF 17-4PH STEEL, HOMOGENIZED VERSUS AS RECEIVED CONDITION,
by John F. Hildebrand. 15 Apr 64, 8p. Rept. no. FTM3226
Unclassified report

Descriptors: (*Stainless steel, Mechanical properties), (*Metal plates, Heat treatment), Ductility, Aging (Materials), Elasticity, Microstructure, Microscopy, Electron microscopy, Jet fighters.

For the particular heat of 17-4PH steel plate involved, homogenizing treatment improved the ductility as measured by the reduction of area and reduced the spread in ductility data for each aged condition. (Author)

AD-438 176 Div. 17
OTS price $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
BERYLLIUM: AN ANNOTATED BIBLIOGRAPHY OCTOBER - DECEMBER 1962, SUPPLEMENT III,
comp. by Jack B. Goldmann. Apr 63, 58p. Rept. no. 3 80 63 2; SB62 22
Contract NOrd17017
Unclassified report

Descriptors: (*Beryllium, Bibliographies), (*Bibliographies, Beryllium), Abstracts, Beryllium alloys, Beryllium compounds, Corrosion, Manufacturing methods, Joining, Powder metallurgy, Casting, Processing, Physical properties, Mechanical properties.

This annotated bibliography covers publications released during the fourth quarter of 1962. Citations are arranged alphabetically by author under the broad subject headings of Alloys; Analysis; Applications; Bibliographies; Compounds; Corrosion; Fabrication Techniques; Joining; Mineralogy; Oxides; Powder Metallurgy; and Casting; Processing, Properties and Miscellaneous. Reference to the use of beryllium fuels, nuclear reactor applications, effects of radiation, and Cu-Be alloys are omitted. (Author)

AD-438 478 Div. 17
OTS price $2.60

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
STUDY OF SIZE EFFECT IN FINE BERYLLIUM WIRE PHASE II,
by Paul Soltis. 27 Mar 64, 2p.
NAEC AML1909 Unclassified report

Descriptors: (*Beryllium, Wire), (*Metallic textiles, Beryllium), Fibers, Tensile properties, Chemical milling, Test equipment, Hardness, Grain structures (Metallurgy), Photomicrography, Fracture (Mechanics), Ductility, Scale.

OF D6 AIR AND VACUUM MELT MATERIAL,
by Richard C. Davis and William S. Crownover.
26 Mar 64, 39p.
DA Proj. 1B222901A205
AMC RA RK TR64 11 Unclassified report

Descriptors: (*Rocket cases, Steel), (*Steel, Toughness), Melting, Air, Low-pressure research, Mechanical properties, Tensile properties, Shear stresses, Fracture (Mechanics), Thickness, Controlled atmospheres, Argon, Heat treatment.

An investigation was made into the relative toughness properties of D6 air melt and D6AC vacuum melt material. This was accomplished to determine which type of material would be better suited for use in the construction of solid propellant motor cases. Standard smooth tensile and notched tensile tests were performed on both materials over a range of thickness and temperatures. The smooth tensile test indicated very little difference between the D6 air and D6AC vacuum melt material. The notched tensile test, however, indicated that the D6AC vacuum melt material possesses much better toughness properties than does the D6 air melt material. (Author)

AD-439 231 Div. 17
OTS price $8.10

Materials Research and Development Manlabs, Inc., Cambridge, Mass.
THERMOMECHANICAL TREATMENTS APPLIED TO ULTRAHIGH-STRENGTH BAINITES.
Final technical rept.,
by D. Kalish and S. A. Kulin. Apr 64, 89p.
Contract N600 19 59811
Unclassified report

Descriptors: (*Steel, Mechanical properties), (*Bainite, Transformations), Austenite, Martensite, Heat treatment, Deformation, Mechanical working, Quenching (Cooling), Strain (Mechanics) Microstructure, Metallography, Grain structures (Metallurgy), Electron microscopy, X-ray diffraction analysis, Transition temperature, Hardness, Tensile properties, Toughness, Fracture (Mechanics), High-temperature research, Stresses, Cryogenics.

The mechanical properties of H11 and AISI 4350 steels were determined for a series of bainites formed from both deformed and undeformed austenites. These bainites were also subjected to subsequent straining and tempering treatments. Similar thermomechanical treatments involving martensite as the essential transformation product were included for comparison purposes. (Author)

AD-439 384 Div. 17, 25
OTS price $5.60

Naval Ordnance Test Station, China Lake, Calif.
EFFECTS OF ULTRASOUND ON DEFORMATION CHARACTERISTICS OF STRUCTURAL METALS,
by B. Langenecker, W. H. Frandsen, C. W. Fountain, S. R. Colberg and J. A. M. Langenecker.
Mar 64, 57p.
NOTS TP 3447; NAVWEPS 8482
Unclassified report

Descriptors: (*Metals, Deformation), (*Deformation, Ultrasonic radiation), (*Ultrasonic radiation, Material forming), Crystal lattice defects, Mechanical waves, Absorption, Plasticity, Propagation, Theory, Stresses, Hardening, Zone melting, Refining (Metallurgy), Shear stresses, Strain (Mechanics), Instrumentation, Photoelasticity, Metallic crystals, Single crystals, Aluminum, Zinc, Beryllium, Stainless steel, Steel, Tungsten, Metallography, Crystal lattices, Elasticity, X-ray diffraction analysis.

Ultrasound is presented as a new means of studying properties of metals from the viewpoint of dislocation theory. Ustrasound is shown to be efficiently absorbed at dislocations resulting in significant effects on metal plasticity. Materials used were single crystal zinc and aluminum, and polycrystalline aluminum, beryllium, steel and tungsten. Methods of specimen preparation and modified metallographic studies are presented along with sources of ultrasound (up to 100 w/sq cm at 20 kc) and devices for the determination of field intensities. A discussion is given of present theories pertaining to the interaction of ultrasonic stress waves and lattice imperfections. The basic investigations resulted in concepts of ultrasonic forming of metals where extensive yielding of metals caused by ultrasound is utilized. (Author)

AD-439 443 Div. 17, 32
OTS price $6.60

Lockheed Missiles and Space Co., Sunnyvale, Calif.
NICKEL-IRON PERMALLOY FILMS: AN ANNOTATED BIBLIOGRAPHY,
by Jack B. Goldman. Sep 63, 69p. Rept. no. 3 26 63 6; SB63 62
Contract NOw62 0363
Unclassified report

Descriptors: (*Bibliographies, Metal films), (*Metal films, Bibliographies), Iron alloys, Nickel alloys, Material forming, Magnetic alloys, Abstracts, Indexes, Thin films (Storage devices), Vapor plating.

The core of references with which this annotated bibliography is concerned consists of entries pertaining to the making of iron films, nickel films, nickel-iron or Permalloy films by means of thermal decomposition of the carbonyls, reduction of the halides or other methods. The use of high vacuum techniques is omitted. The period, 1958-July 1963 is covered by the contents. The resources of Lockheed Missiles and Space Company Technical Information Center were utilized in the preparation of this bibliography. (Author)

AD-439 592 Div. 17
OTS price $6.60

Pittsburgh U., Pa.
AN INVESTIGATION OF A METHOD FOR MEASURING LOCALIZED DAMPING,
by George Franklin Kirby. 1963, 64p.
Unclassified report

Master's Thesis.

Descriptors: (*Damping, Measurement), (*Fatigue (Mechanics), Damping), Vibration, Structures, Elasticity, Stresses, Strain (Mechanics), Mathematical analysis, Metals, Failure (Mechanics), Airframes, Grain structures (Metallurgy), Crystal lattice defects, Test methods.

AD-439 675 Div. 17
OTS price $1.60

M S A Research Corp., Callery, Pa.
FACTORS AFFECTING THE COMPATABILITY OF LIQUID

stress-rupture properties at temperatures in the 2000 to 2400 F range. Initial work involves the determination of short-time creep behavior of certain promising compositions in vacuum at 2200 F. The effect of tantalum, tungsten, and molybdenum additions on creep of V-60b-1Ti is being determined. Reinvestigation on certain binary systems, notably V-Ta, is being carried out with the hope of formulating beneficial heat treatments for enhancement of high-temperature properties. (Author)

AD-438 919 Div. 17, 26, 20
OTS price $8.10

North Carolina State Coll., Raleigh.
DISPERSED URANIUM MONOCARBIDE - URANIUM NUCLEAR FUEL MATERIAL,
by Anthony J. Mione. 1963, 90p.
Unclassified report

Doctoral thesis.

Descriptors: (*Uranium compounds, Carbides), (*Reactor fuels, Uranium compounds), Hydroforming (Mechanical), Material forming, Powder metallurgy, Sintering, Dioxides, Microstructure, Cyclohexanes.

The factors affecting the production of a nuclear fuel material consisting of a fine, uniform dispersion of uranium monocarbide in a uranium metal matrix were determined. Theoretical considerations indicated that a uniform dispersion of small, hard particles in uranium fuels would eliminate the swelling associated with release of fission gas products during irradiation that severely limits the usefulness of uranium fuel elements. Uranium monocarbide was selected for the dispersed phase because of its excellent combination of physical and nuclear properties. (Author)

AD-438 921 Div. 17, 14
OTS price $1.10

IIT Research Inst., Chicago, Ill.
FIBER-REINFORCED METALS AND ALLOYS.
Bimonthly rept. no. 2, 8 Jan-8 Mar 64,
by N. M. Parikh. 19 Apr 64, 10p. Rept. no. B6020 2
Contract NOw64 0066c, Proj. B6020
Unclassified report

Descriptors: (*Composite materials, Metals), (*Reinforcing materials, Fibers), (*Fibers, Reinforcing materials), Metallic textiles, Steel, Silver, Impregnation, Ceramic fibers, Carbides, Tungsten compounds, Crystal growth, Zone melting, Tensile properties.

The fundamentals of fiber reinforcement are being studied on the mild steel fiber reinforced silver system. All composites prepared to date were fabricated by infiltration of molten silver into a fiber felt. Preparation of a felt with oriented fibers (0.002 in.) was somewhat difficult, and this alignment was achieved magnetically. The second part of this program--dealing with the production of high-strength carbide fibers--consists of growing WC fibers in a liquid cobalt rich solute. Previous experiments had indicated that if an alloy consisting of tungsten carbide and cobalt were subjected to temperature gradient zone melting, the WO crystals could be made to grow. If the direction of zone travel could be made unilateral, the growing crystals had a fibrous shape. (Author)

AD-439 085 Div. 17
OTS price $1.10

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
EVALUATION OF FINE, ANODIZED BERYLLIUM WIRE.
7 May 64, 2p.
NAEC AML 1943 Unclassified report

Descriptors: (*Beryllium, Mechanical properties), (*Wire, Beryllium), Coatings, Anodes (Electrolytic cells), Tensile properties, Degradation, Oxidation.

Tensile data on fine, anodized beryllium wire are presented. Tensile strength of the as-drawn wire was reported at about 179,000 psi and elongation fell in the range 1.0 to 2.1%. The tensile strength of the wire definitely shows a significant loss when compared with the value reported for as-drawn material. It is difficult not to attribute this loss to the anodizing treatment or possibly to some intermediate chemical treatment used in the anodizing process. Damage conceivably could come from stress corrosion and/or pitting. (Author)

AD-439 216 Div. 17
OTS price $4.60

General Electric Co., Schenectady, N. Y.
PEST REACTIONS IN INTERMETALLIC COMPOUNDS. II. INVESTIGATIONS ON NiAl, AND TWO MoSi2 STRUCTURES.
Rept. for Feb 63-Feb 64,
by A. U. Seybolt and J. H. Westbrook. Apr 64, 46p.
Contract AF33 657 7980, Proj. 7350, Task 735001
ASD TDR63 309, pt. 2 Unclassified report

Report on ''Refractory Inorganic Nonmetallic Materials.''

Descriptors: (*Aluminum alloys, Mechanical properties), (*Nickel alloys, Brittleness), (*Molybdenum compounds, Hardening), Silicides, Chromium alloys, Grain boundaries, Oxygen, Diffusion, Crystal lattice defects, Degradation, Heat treatment, Electron microscopy, X-ray diffraction analysis, Metallography.

The grain boundary hardening phenomena investigated earlier in the case of the intermetallic compound NiGa have been found to occur in much the same manner in NiAl. As before, an oxygen-contamination heat treatment followed by a sufficiently high temperature quench shows no hardening, but subsequent lower temperature aging sets up hardening. Hardening occurs in the bulk as well as along grain boundaries, but generally the effect is harder to observe in the former case because of shallow oxygen penetration in the bulk as compared to the grain boundaries. A vacancy-oxygen atom interaction model is suggested as a likely explanation for the observed hardening. Some observations have been made on pest failure in MoSi2, and grain boundary hardening in the structural analog CrAl2. It is difficult to find suitable experimental techniques to study the pest failure of MoSi2. As-cast material is more susceptible to pest failure than MoSi2 coatings on molybdenum sheet. (Author)

AD-439 222 Div. 17, 27
OTS price $3.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
A COMPARISON OF THE TOUGHNESS CHARACTERISTICS

conflict situations. The primary stimulus for MILITRAN has been two-fold: (1) the increasing importance of the simulation approach in the analysis of military systems, and (2) the long periods of time and high levels of effort required to produce an operating simulation program. MILITRAN achieves improved coding efficiency by providing a programming language--the MILITRAN language--which is oriented to the special problems and procedures of military simulation. Because of this special orientation, simulation codes can usually be written in the MILITRAN language more easily, more quickly, and with less likelihood of error. The ultimate communication with the computer is effected through the MILITRAN compiler, a special program that translates source codes written in the MILITRAN language into a form directly understandable by the computer. (Author)

AD-439 251 Div. 18, 16
OTS price $12.00

Psychological Labs., Univ. of Georgia, Athens.
SHELTER OCCUPANCY STUDIES AT THE UNIVERSITY OF GEORGIA, 1962-1963.
Final rept.
by John A. Hammes and R. Travis Osborne. 31 Dec 63, 169p.
Contract OCD OS 62 226
Task 1521A

Unclassified report

Descriptors: (*Shelters, Civil defense systems), Radioactive fallout, Survival, Models (Simulations), Instrumentation, Design, Test methods, Controlled atmospheres, Temperature, Humidity, Food, Water supplies, Behavior, Nutrition, Blood analysis, Adjustment (Psychology), Excretion.

A detailed report is presented of a series of tests on the habitability of fallout shelters as presently stocked in accordance with the National Shelter Program. These studies surpassed in austerity all previous shelter research using civilians. Men, women, and children, age 7-70 years, participated in two-week confinement tests. (Author)

AD-439 377 Div. 18
OTS price $2.60

Princeton Univ., N. J.
VERIFICATION OF DISARMAMENT BY INSPECTION: A GAME THEORETIC MODEL,
by Morton Davis. 3 Dec 63, 23p. Rept. no. RM62

Unclassified report

Descriptors: (*Disarmament, Mathematical models), Game theory, Mathematical analysis, Probability.

The problem is to determine the proper behavior of two parties to a disarmament agreement: one, the inspector attempting to either inhibit evasion or to maximize the probability of detecting any evasion should it occur, the other, an evader or possible evader, attempting to evaluation the possible gains from evasion, the possible losses in being caught evading, and thus deciding whether to evade or not, and if deciding to evade how to do so with the least chance of being caught. The model is a simplification of reality with an assumption that the evader has decided to evade and has but to choose the ''proper'' manner. As an input to such decisions, it is important to know the consequences of evading, so that the problems considered, logically precede the ones ignored. The model has an inspector and evader with diammetrically opposed interests, trying to raise and lower, the probability of detecting evasions, respectively. In the terminology of Game Theory, this is a zero-sum game. (Author)

AD-439 396 Div. 18, 16
OTS price $1.60

Psychological Labs., Univ. of Georgia, Athens.
SHELTER OCCUPANCY STUDIES AT THE UNIVERSITY OF GEORGIA, 1962-1963.
Final summary rept.
by John A. Hammes. 31 Dec 63, 12p.
Contract OCD OS62 226
Task 1521A

Unclassified report

Descriptors: (*Shelters, Civil defense systems), Tests, Radioactive fallout, Survival, Tests, Human engineering, Construction, Food, Water supplies, Sanitary engineering, Behavior, Management planning, Adjustment (Psychology).

During 1962 and 1963 the University of Georgia Psychological Laboratories conducted a series of tests on the habitability of fallout shelters as presently stocked in accordance with the National Shelter Program. These studies surpassed in austerity all previous shelter research using civilians. Men, women, and children, age 7 - 70 years, participated in two-week confinement tests. (Author)

AD-439 499 Div. 18
OTS price $2.60

Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
A PARAMETRIC STUDY OF THE DELIVERY UNDER RISK PROBLEM AS IT APPLIES TO INTERDICTION COST-EFFECTIVENESS,
by D. S. Dunlap and J. Mae Pettress. Apr 64, 29p.

Unclassified report

Descriptors: (*Limited war, Aircraft), (*Operations research, Payload), Vulnerability, Costs, Kill probabilities, Probability, Army aircraft, Bombing.

A parametric analysis is presented of the 'delivery under risk' problem. Contours of equal payoff are drawn as a function of a non-dimensional efficiency ratio, i.e., lbs/dollar deliverable per sortie by aircraft type 'a' divided by lbs/dollar deliverable per sortie by aircraft type 'i.' The two aircraft differ also in their vulnerability to enemy defenses. This difference is parameterized, and resulting contours of equal payoff are plotted as a function of enemy defense encounter rate. The resulting set of figures may be useful to analysts when used in conjunction with weapon system data, estimates of single encounter probabilities of kill, and encounter rates based upon assessment of the defense environment. Since the variables are parameterized, the analyst may find original ways of estimating the likely regions where comparisons may be made. (Author)

AD-439 612 Div. 18
OTS price $18.00

Cornell Univ., Ithaca, N. Y.
THE USE OF VOLUNTARY ORGANIZATIONS IN CIVILIAN DEFENSE AND PREPAREDNESS,
by Lois R. Dean. Mar 64, 285p.
Contract OCD OS62 72

Unclassified report

CESIUM WITH CONTAINMENT METALS.
Quarterly progress rept. no. 6, Dec 63-Feb 64,
by F. Tepper and J. Greer. 16 Mar 64, 16p.
Rept. no. 64 27, Contract AF33 657 9168
Unclassified report

Descriptors: (*Cesium, Liquid metals), (*Compatibility, Refractory metal alloys), (*Corrosion, High-temperature research), Nickel alloys, Thorium alloys, Thorium compounds, Dioxides, Niobium alloys, Zirconium alloys, Titanium alloys, Metallography, Solid solutions, Solubility, Carbon, Diffusion, Cobalt alloys, Chromium alloys, Tungsten alloys.

Tests with the dissimilar metal couples TD-Nickel vs Nb-1%Zr, TD-Nickel vs Mo-1/2%Ti and Nb-1%Zr s Mo-1/2%Ti have continued with metallographic, chemical and also microprobe analyses. Solubility studies on the refractory alloys Nb-1%Zr and Mo-1/2%Ti have indicated that the solubilities of the major constituents are approximately 20 ppm and that there are possible synergistic effects resulting from the presence of the alloying elements. Capsules fabricated from Haynes-25 alloy and TD-Nickel have shown relatively little attack upon exposure to refluxing cesium at 1800 F and Mo-1/2%Ti alloy has survived a 255 hr test at 2500 F showing some dissolution of the alloy in the boiling liquid cesium. (Author)

AD-439 842 Div. 17
OTS price $3.60

IIT Research Inst., Chicago, Ill.
PROPERTIES OF ULTRA-HIGH STRENGTH BAINITIC STRUCTURES.
Rept. for 1 May 62-15 Mar 63,
by Charles R. Simcoe and John P. Sheehan. May 63, 36p. Rept. no. B240 11
Contract AF33 637 8426, Proj. 7351, Task 735105
ASD TDR63 458 Unclassified report

Report on Metallic Materials.

Descriptors: (*Steel, Mechanical properties), (*Bainite, Mechanical properties), (*Fracture (Mechanics) Toughness), Microstructures, Martensite, Transformations, Transition temperature, Heat treatment, Carbon, Carbides, Quenching (Cooling), Tensile properties.

The tensile properties and fracture toughness were measured in sheet material for isothermally transformed lower bainite and tempered martensite in a series of alloy steels. The major experimental variables were transformation temperature, tempering temperature, carbon content, and alloy additions. Carbon contents of 0.55 to 0.60% or higher are required to develop ultra-high strength levels in lower bainite. Lower bainite with yield strengths above 220,000 psi had slightly to moderately lower fracture toughness than tempered martensite in typical low alloy steels at comparable yield strengths. At yield strengths below 220,000 psi, lower bainite was equal to or slightly better than tempered martensite in typical low alloy steels, except the 1Cr-1Mo composition which is superior to the other alloy steels studied at yield strengths up to 240,000 psi. The fracture toughness of lower bainite is discussed in terms of transformation temperature, M sub s temperature, and steel composition. A 9Ni-4Co steel developed an atypical bainitic microstructure at transformation temperatures just above the M sub s temperature. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-438 435 Div. 18, 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
FOREIGN AID -- IS IT WORTH CONTINUING,
by Egon Neuberger. Apr 64, 12p. Rept. no. P2890
Unclassified report

Descriptors: (*Federal budgets, Foreign policy), (*Economics, Foreign policy), Political science, Growth, Analysis.

AD-438 436 Div. 18
OTS price $2.60

RAND Corp., Santa Monica, Calif.
SPACE ARMS CONTROL: TRENDS, CONCEPTS, PROSPECTS,
by Alton Frye. Feb 64, 23p. Rept. no. P 2873
Unclassified report

Descriptors: (*National defense, United States), (*Space flight, Disarmament), (*Disarmament, Space flight), USSR, Arms control, Costs, Foreign policy, Theory, Military organizations, Military strategy.

AD-438 833 Div. 18, 1
OTS price $1.60

Naval Missile Center, Point Mugu, Calif.
A STOCHASTIC MODEL FOR DISPATCHING GROUND-SUPPORT AIRCRAFT,
by M. Brown. 27 Apr 64, 13p.
NMC TM64 4 Unclassified report

Descriptors: (*Aircraft, Scheduling), Tactical warfare, Logistics, Mathematical analysis, Mathematical models, Stochastic processes, Effectiveness, Distribution, Determination.

Ground-support aircraft are dispatched at present according to a deterministic schedule. An investigation is made of a possible stochastic alternative to this, in which the aircraft are dispatched according to an appropriately selected Poisson distribution. The tactical constraint imposed in both cases is that aircraft are to be made available on call if none are on station or en route. An efficiency is defined which measures the relative economy of aircraft required by the two scheduling doctrines. A criterion is suggested, in terms of this efficiency, for indicating when each of the two doctrines should be employed. It is found that under all conditions of practical interest, the deterministic doctrine now in use is superior to the proposed alternative. (Author)

AD-438 866 Div. 18
OTS price $2.60

Systems Research Group, Inc., New York.
A PREVIEW OF MILITRAN, A SYSTEM FOR THE DEVELOPMENT OF COMPUTER PROGRAMS THAT SIMULATE MILITARY SITUATIONS.
Jan 62, 22p.
Unclassified report

Descriptors: (*Programming (Computers), Military strategy), (*Warfare, Programming (Computers)), Programming languages, Data processing systems.

The MILITRAN System provides a procedure for achieving easier and more rapid development of computer programs for the simulation of military

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-437 902 Div. 20
OTS price $3.60

Uppsala Univ. (Sweden).
STUDIES IN PERTURBATION THEORY. VIII. SEPARATION OF DIRAC EQUATION AND STUDY OF THE SPIN-ORBIT COUPLING AND FERMI CONTACT TERMS,
by Per-Olov Lowdin. 1 Nov 63, 32p. TN110
Contract AF61 052 701
ARL 64 86 Unclassified report

Descriptors: (*Perturbation theory, Quantum mechanics), Wave functions, Energy, Hamiltonian, Nuclear spin, Hyperfine structure, Magnetic fields.

The partitioning technique is used to separate the Dirac equation. The Spin-Orbit Coupling and the Fermi contact are studied. (Author)

AD-437 994 Div. 20
OTS price $5.60

Naval Radiological Defense Lab., San Francisco, Calif.
MEASUREMENTS OF THE EFFECTS OF COMPARTMENTALIZATION ON THE GAMMA-RAY AND NEUTRON DOSE RATE IN THE RADIATION FIELD OF A REACTOR,
by W. E. Thompson and F. C. Engesser. 17 Feb 64, 53p.
NRDL TR722 Unclassified report

Descriptors: (*Nuclear reactors, Dose rate), (*Dose rate, Reactor hazards), Neutron flux, Radiation hazards, Shielding, Reactor safety systems, Gamma rays, Reactor shielding materials.

Data illustrating the effects of various components of a simply compartmented structure on the dose-rate field near a reactor were gathered at the Tower Shielding Facility (TSF) of Oak Ridge National Laboratory (ORNL) and are presented in forms allowing convenient comparisons between gamma-ray and neutron dose rates for given configurations. These effects were found to be nearly equivalent to the additive effects of the sides of the compartment considered separately, thus adding credence to the assumption that each slab contributes to the total dose rate independently. By weighting these contributions according to solid angle, a method is worked out which consistently predicts the dose rate for any configurations not involving double transmission. (Author)

AD-438 046 Div. 20
OTS price $1.10

Pennsylvania U., Philadelphia.
DETERMINATION OF HYPERFINE INTERACTIONS IN SOLIDS BY THE USE OF RADIOACTIVE NUCLEI.
Final rept. 15 Oct 60-14 Jan 64,
by M. E. Caspari and S. Frankel. 15 Apr 64, 5p.
Grants DA ORD31 124 61G38; DA ARO D31 124G66
AROD 30066 Unclassified report

Descriptors: (*Hyperfine structure, Relaxation time), (*Rare earth compounds, Excitation), Ions, Iron compounds, Attenuation, Magnetic fields, Beta decay, Metallic compounds, Mossbauer effect.

AD-438 130 Div. 20
OTS price $5.60

California Univ., Riverside.
THEORY OF SCATTERING IN SOLIDS,
by Joseph Callaway. 1964, 53p. TR2
Grant AF AFOSR 62 318
Unclassified report

Descriptors: (*Nuclear scattering, Excitation), Potential scattering, Phonons, Differential cross section, Transport theory, Impurities, Perturbation theory, Crystal lattice defects.

The general theory of the scattering of excitations in solids by localized imperfections is discussed. The solid state analog of the usual partial wave expansion of the scattering amplitude is derived. In an appendix, the applicability of the general theory to phonons and spin waves as well as electrons is discussed. (Author)

AD-438 147 Div. 20
OTS price $8.10

Army Biological Labs., Frederick, Md.
RADIOLOGICAL SAFETY MANUAL,
by A. G. Wedum. Dec 63, 89p.
Unclassified report

Descriptors: (*Radioactivity, Safety), (*Instruction manuals, Radioactivity), Radiation hazards, Permissible dosage, Radiactive isotopes, Radiological contamination, Instrumentation, Radiation alarms, Decontamination, Therapy, Accidents, Protective clothing, Storage, Biological assay.

AD-438 434 Div. 20
OTS price $4.60

Rand Corp., Santa Monica, Calif.
SOLUTIONS OF THE THOMAS-FERMI-DIRAC STATISTICAL MODEL OF ATOMS,
by Richard Latter. Apr 64, 47p. Rept. no. P 2783
Unclassified report

Descriptors: (*Atoms, Physical properties), (*Tables, Differential equations), (*Atoms, Statical analysis), Statistical distributions, Difference equations, Programming (Computers).

Numerical integration of the Thomas-Fermi-Dirac equation on the IBM 701 has been carried out for atomic numbers Z = 1 to 100. Compressed, expanded and isolated atoms were treated, the latter using the boundary condition suggested by Jensen. Tables of the solutions are given for all isolated atoms and for selected values of Zin the case of compressed and expanded atoms. The physical properties of interest for isolated atoms and the pressure-volume relationship for compressed and expanded atoms are presented tabularly. Other physical properties are presented graphically. (Author)

AD-438 711 Div. 20, 22, 9
OTS price $6.60

General American Transportation Corp., Niles, Ill.
THEORETICAL STUDY OF ENERGY DISTRIBUTION IN A HALF-SPACE RESULTING FROM DYNAMIC LOADING IN A DEPRESSION AT THE ORIGIN.
Final rept.
Mar 64, 62p.
Contract AF29 601 5813, Proj. 1080, Task 108007
RTD TDR63 3125 Unclassified report

Descriptors: (*Civil defense systems, Preparation), (*Group dynamics, Civil defense systems), Behavior, Leadership, Social communication, Costs, Attitudes, Shelters, Urban areas, Social sciences, Economics, Public opinion.

19. NAVIGATION

AD-437 927 Div. 19
OTS price $12.00

Honeywell Inc., Minneapolis, Minn.
ELECTROSTATIC GYRO EVALUATION PROGRAM, PHASE II. DEVELOPMENT OF ESG TEST EQUIPMENT.
Final rept.
by F. A. Andrews, M. H. Riesgraf, T. N. Berlage, A. Shalloway and C. Bare. Jan 64, 165p. Rept. no. 2941 FR1
Contract AF33 616 8350
Unclassified report

Descriptors: (*Gyroscopes, Electrostatics), Test equipment, Checkout procedures, Inertial guidance, Gimbals, Azimuth, Calibration, Data processing systems, Monitors, Junction boxes, Electronic equipment, Allignment.

This report describes the development, procurement, fabrication and checkout of test equipment required for the evaluation of electrically suspended gyros in the gambaled and strapdown modes. This equipment was used under Phase III of this contract to evaluate comprehensively the two AESG's developed. Actual test results on the gyros will be found in the Phase III Test and Evaluation Report. (Author)

AD-438 941 Div. 19, 2
OTS price $4.60

Naval Weapons Lab., Dahlgren, Va.
NEW TECHNIQUES FOR COMPUTING LORAN MAPS,
by A. V. Hershey and E. J. Hershey. 21 Jan 64, 46p.
NWL 1902 Unclassified report

Descriptors: (*Loran, Navigation charts), Mapping, Programming (Computers), Mathematical analysis, Position finding, Ships, Polynomials, Geodesics, Errors, Curved profiles, Time.

A preexisting program for plotting section lines of a ship has been adpated to the contouring of LORAN maps. The method is based on approximations of the square of geodesic time difference to avoid singularities at the transmitting stations. Maximum errors are tabulated for a few representative maps. (Author)

AD-439 583 Div. 20
OTS price $3.60

Nuclear Development Corp., of America, White Plains, N. Y.
PENETRATION OF NEUTRONS FROM A POINT FISSION SOURCE IN AIR; MOMENTS METHOD CALCULATION,
by D. Spielberg. 28 Apr 61, 32p. Rept. no. 2106 10
Contract DA30 069 5050RD2460, Proj. 5B93 32 005; 00 Proj. TB4 005
WAL TR551 1 2 Unclassified report

Descriptors: (*Neutrons, Penetration), (*Fission neutrons, Air), Energy, Distribution, Fission, Sources, Moments, Dose rate, Functions, Dosage, Gamma rays, Neutron capture, Neutron capture gamma rays, Fission products.

The spatial and energy distributions of neutrons from a point fission source in air were calculated by the moments method. The results were used to calculate the neutron and capture-gamma doses as functions of distance from the source. (Author)

AD-439 595 Div. 20
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
MEASURING RANGE: FROM 0.4 to 1,000,000 ROETGENS PER MINUTE,
by N. Žukov. 27 Mar 64, 5p.
FTD TT64 31 Unclassified report

Trans. from Nauka I Zhizn', No. 9, pp. 24-25, 1963, From Russian text.

Descriptors: (*Radiation hazards, Measurement), (*Nuclear reactors, Radiation hazards), X-rays, Safety, Safety devices, Oxygen, Instrumentation, Oxygen masks, Dosimeters, Dosage, Dose rate.

AD-439 641 Div. 20
OTS price $9.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
NEUTRON REFLECTION AND FLUX VERSUS DEPTH FOR ALUMINUM WITH AN APPENDIX NEUTRON DOSE TRANSMISSION VERSUS THICKNESS,
Rept. no. 5,
by Frank J. Allen, Arnold T. Futterer and William P. Wright. Feb 64, 103p.
RDT & E Proj: 1A022601A088
BRL 1238 Unclassified report

Descriptors: (*Aluminum, Neutron flux), (*Neutron flux, Reflection), Dose rate, Monte Carlo method, Albedo, Energy, Neutron scattering, Data, Tables, Shielding, Thickness.

Detailed calculated results of neutron reflection and flux versus depth for aluminum are given in the form of machine printouts. The angular and enerby distributions of the reflected neutrons along with the energy-dependent and total flux at various depths are contained in tabular form on the printouts. Neutron number current, number flux, and dose transmission, as functions of thickness, are also given in tabular form on the printouts. A table of summary information on reflection is presented. This contains number current, number flux, dose, and energy reflection factors as functions of incident energy and angle. A few figures are presented to illustrate graphically the various tabular results. An appendix contains the dose transmission results as a function of incident angle and slab thickness for the various incident energies. (Author)

AD-439 684 Div. 20, 25, 8
OTS price $1.10

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
RADIATION EFFECTS PARAMETERS IN NAP APPLICATIONS.
Quarterly progress letter no. 3, Dec 63-Feb 64.
17 Mar 64, 8p. Rept. no. BSR 890
Contract AF29 601 5911
Unclassified report

Descriptors: (*Radiation effects, Test reactors), (*Gamma emission, Cobalt), Isotopes, Measurement, Transistors, Semiconductors, Research program administration, Neutron spectrum.

AD-439 807 Div. 20
OTS price $1.60

Florida Univ., Gainesville.
ADDENDUM TO FINAL TECHNICAL REPORT ON THE NUCLEAR PROPERTIES OF RHENIUM.
Final technical rept.,
by E. E. Menge, W. H. Ellis, R. A. Karam and T. F. Parkinson. Dec 63, 15p.
Contract NOas60 6021c
Unclassified report

Addendum to AD-402 668.

Descriptors: (*Rhenium, Nuclear properties), Scintillation counters, Gamma-neutron reactions, Neutron capture gamma rays, Neutron capture, Photomultipliers, Gamma-ray spectra, Neutron absorption.

The energy and intensity of the capture gamma transitions of natural rhenium were determined with a NaI(Tl) scintillation detector using a neutron-gamma beam from the thermal column of the University of Florida Training Reactors. The results obtained agreed rather well with those reported by other experimenters who used different techniques. (Author)

AD-439 837 Div. 20
OTS price $5.60

Astronuclear Lab., Westinghouse Electric Corp., Pittsburg, Pa.
ENGINEERING STUDY OF NUCLEAR POWER PLANT FOR MANNED LUNAR BASES.
Monthly rept.
30 Sep 63, 56p. Rept. no. PR S001A
Unclassified report

Descriptors: (*Nuclear power plants, Lunar bases), Reactor feasibility studies, Reactor shielding materials, Shielding, Design, Payload, Dose rate, Lunar environment, Magnetohydrodynamics, Energy conversion.

21. NUCLEAR PROPULSION

No Entries

Descriptors: (*Nuclear explosions, Soil mechanics), (*Soil mechanics, Elasticity), Viscoelasticity, Hydrodynamics, Pressure, Cratering, Nuclear weapons, Stresses, Equations.

An analysis of the free-field ground motion in the elastic region due to the energy delivered directly to the ground by a nuclear weapon is presented. The problem is approached along two different lines. One of these approaches treats the elastic region as a cratered half-space, where the hemi-spherical boundary of the crater is subjected to the pressure history exerted by a hydrodynamic region within the crater. The other approach treats the elastic region as a complete half-space, a portion of which has initial motion and pressures corresponding to the state of the hydrodynamic region at some instant when its behavior is becoming more nearly elastic than hydrodynamic. For the cratered-half-space approach, exact analytical expressions are obtained for the stresses at the wavefront, and numerical results based on these expressions are presented. For the complete-half-space approach, analytical results alone are obtained. (Author)

AD-438 908 Div. 20, 25, 15
OTS price $7.60

Technical Operations, Inc., Burlington, Mass.
MONTE CARLO COMPUTATION OF 100,000 1 MeV GAMMA RAYS SCATTERED BY CONCRETE SLABS.
Final rept.,
by Dominic J. Raso. Mar 64, 76p. Rept. no. TO B 64 31
Contract NBy32237
Unclassified report

Descriptors: (*Structures, Concrete), (*Concrete, Gamma-ray scattering), (*Gamma-ray scattering, Monte Carlo method), (*Photons, Scattering), Programming (Computers).

Monte Carlo calculations were performed to determine the back scattering of 1.0 MeV gamma rays from concrete and their transmission through slabs of this medium. The radiation was assumed to be incidnet at various angles on a semi-infinite medium and on slabs with thicknesses of 0.55, 1.1, 2.2, and 4.4 mfp. Case histories of 100, 000 photons were followed in groups of 20,000 on an IBM 7090 digital computer for each of the six incidnet angles. Differential dose and number distributions as a function of azimuthal and polar angles are reported. (Author)

AD-438 955 Div. 20
OTS price $8.10

Kaman Nuclear, Colorado Springs, Colo.
MoLLY-G REACTOR.
Preliminary Hazards Summary rept.,
by Kay B. Carver. 22 May 63, 84p. Rept. no. 63 685 11HSR
Contract DA29 040ORD2919
Unclassified report

Descriptors: (*Nuclear reactors, Radiation hazards), (*Radiation hazards, Nuclear reactors), Nuclear explosions, Simulation, Fission, Radiation damage, Analysis, Nuclear explosion damage, Fission products, Safety, Safety devices.

The Bare Critical Assembly, MoLLY-G, located at the White Sands Missile Range (WSMR), New Mexico, is a prompt-critical reactor designed to simulate the radiation environments of nuclear detonations. The MoLLY-G is located at a remote test site 3 miles southeast of the central headquarters of WSMR. The potential hazard to the general public is essentially zero under all conceivable circumstances, including the maximum credible accident. When operated in accordance with prescribed safety regulations, standards and codes, there is no hazard to the operating and using personnel. Maximum safety has been provided in all areas of potential hazard. Safety features include: radiation shielding, interlocks, controlled access, remote viewing, remote control, and fail-safe provisions in performing components. Based upon the analysis of this hazards report, the MoLLY-G can be operated safely as a part of the Nuclear Effects Laboratory Facility. (Author)

AD-439 331 Div. 20
OTS price $1.60

Illinois Univ., Urbana.
ABSORPTION OF NEGATIVE PI MESONS IN LIGHT NUCLEI,
by G. T. Condo and R. D. Hill. Mar 64, 11p. Rept. no. TR46
Contract Nonr183405
Unclassified report

Descriptors: (*Pions, Absorption), Meson capture, Alpha particles, Nuclei, Carbon, Nitrogen, Oxygen.

The work is aimed at identifying the interactions of negative pi mesons with C, N, and O nuclei and also at attempting to understand certain nuclear physical aspects of these interactions. (Author)

AD-439 332 Div. 20
OTS price $7.60

Technical Operations, Inc., Burlington, Mass.
PROTECTION FACTORS OF EMERGENCY SHELTERS IN A BRITISH RESIDENCE,
by Joseph D. Velletri, Nancy-Ruth York and John F. Batter. Nov 63, 75p. Rept. no. B63 41
Contract OCD OS62 14, Task 1111A
Unclassified report

Descriptors: (*Radioactive fallout, Shelters), (*Civil defense systems, Radioactive fallout), Models(Simulation), Construction, Effectiveness, Instrumentation, Radiation monitors, Radiological contamination, Buildings, Dose rate, Experimental data, Great Britain, Test methods.

The check (1) the validity of the fallout protection factor calculations for residential structures given in British Home Office and U.S. OCD Engineering Manuals and (2) the validity of radiation scale modeling, the United States and the United Kingdom in a joint effort tested one full-scale typical residence (100 psf exterior walls) and two models thereof (50 and 100 psf exterior walls). Each house was tested empty and with various shelter configurations installed. Fallout contamination was simulated by pumping a multicurie encapsulated cobalt-60 source through plastic tubing surrounding the houses. The United States calculations agree with measured dose rates in the 50-psf wall house, while British calculations are slightly lower. Agreement between dose rates measured in the 100-psf wall full-scale and model houses was good at locations away from apertures. Full-scale and model experimental results are generally consistent with both British and U.S. calculations, which show a rectangular shelter to offer maximum protection. (Author)

AD-438 947 Div. 22
OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
OBSERVATIONS OF HYPERVELOCITY IMPACT OF TRANSPARENT PLASTIC TARGETS,
by Ray Kinslow. May 64, 42p.
Contract AF40 600 1000, ARO Proj. VS2401, Task 887101
AEDC TDR64 49 Unclassified report

Descriptors: (*Hypervelocity projectiles, Terminal ballistics), Cratering, Shock waves, Propagation, Fracture (Mechanics), Acrylic resins, Explosive materials, Detonators, Targets, Temperature, Plastics.

Targets of transparent plastic have been impacted with small projectiles at velocities up to 25,000 ft/sec. Photographs made at the rate of approximately 6 x 100000 frames per second show the projectile impact, luminous flash, crater formation, and shock waves in the target. Propagation of the waves and their reflections, and the fractures which they produce, are analyzed. Spalling near the rear surface of the target is seen as the shock is reflected as a tensile wave. Studies of impact of laminated targets show transmission and reflection of shock waves at each interface together with details of the complex fracture formation. These are also analyzed. A theory of fracture is presented which indicates that the fracture of Plexiglas or Lucite is time-dependent. The effects of the target's rear surface and the target temperature are discussed. It is shown that most of the effects of hypervelocity impact may be simulated by the use of explosives placed in small holes in the target face. This not only results in savings of both time and cost, but permits crater location with an accuracy that would be impossible to achieve by the use of a gun. These studies of transparent targets give a better insight into the nature of cratering and fracture by hypervelocity impact. (Author)

AD-439 225 Div. 22, 30
OTS price $5.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
A DIGITAL COMPUTER PROGRAM FOR HIRSCHFELDER INTERIOR BALLISTICS,
by Forrest L. McMains. Apr 64, 36p.
AED TM1404 Unclassified report

Descriptors: (*Interior ballistics, Programming (Computers)), Guns, Projectiles, Digital computer.

A digital computer program was written which will perform interior ballistic calculations on an IBM 709 or IBM 7090. A brief description is given as well as an outline of the method of analysis which this program uses. Examples are presented and both input and output formats are discussed. The purpose of this report is not to evaluate or verify the accuracy of the Hirschfelder System on Interior Ballistics, but only to describe a digital computer program which will perform the Hirschfelder calculations. The results of the hand calculations correspond exactly to the computer results. (Author)

AD-439 335 Div. 22
OTS price $8.60

Army Frankford Arsenal, Philadelphia, Pa.
TELEMETRY PROGRAM FOR THE DEVELOPMENT OF A FUZE FOR THE XM474 PROJECTILE,
by R. A. Kauffmann. Mar 64, 96p.
Proj. 1C5 42718E387
AFA MR M64 25 1 Unclassified report

Descriptors: (*Telemeter systems, Projectile fuzes), Time-delay fuzes, Monitors, Microminiaturization (Electronics), Transducers, Fuze functioning elements, Frequency modulation, Telemetering transmitters, Artillery fire, Research program administration.

Research is presented on the development of a telemetry system to monitor the functionings of a mechanical time fuze mounted in an artillery projectile under actual flight conditions. The development and operation of unique microminiature transducers used to sense the mechanical motion of the various fuze mechanisms are also described. The operation of solid state circuitry which was developed to amplify and process transducer output signals, which modulate the subcarrier oscillators of an FM-FM telemetry transmitter is presented. Also, included in the report are the results of gun-fired, shock and spin testing of transducers, and solid state circuit components, which were subjected to acceleration shocks and spins of 22,000 g's and 22,500 rpm, respectively. The characteristics and availability of radio telemetry transmitters that can be fired in an artillery projectile are also enumerated. (Author)

AD-439 337 Div. 22
OTS price $9.60

Harry Diamond Labs., Washington, D. C.
ANALYSIS AND DESIGN ROTARY-TYPE SETBACK LEAF S&A MECHANISMS,
by William E. Ryan. 11 Feb 64, 118p.
HDL Proj. 46300
HDL TR1190 Unclassified report

Descriptors: (*Safety devices, Projectiles), (*Arming devices, Projectiles), Mortar ammunition, Mathematical analysis, Equation, Motion, Design.

A procedure is described for designing S & A setback mechanisms of the rotary-leaf and spring type to obtain optimum safety and reliability. The design procedure, developed from a mathematical analysis, is described in detail. This procedure is formulated so that little mathematical background is required to use it. An analytical study is made of the effect of varying the mass of the leaves upon the accidental drop safety of the mechanism. The drop safety is defined as the absolute minimum velocity change that can possible arm the device. This figure of merit is derived and evaluated for each set of leaves. This study was made for both fast- and slow-rising acceleration curves, and for restraining springs with both flat and steep spring rates. The results of the analysis in each case indicate that leaves of equal weight are about as safe and reliable as combinations of leaves of varying weights. Also the mechanism performed much as though a constant acceleration was applied to it. The main assumption of the analysis was that friction has an average effective value. (Author)

AD-439 356 Div. 22
OTS price $2.60

General Electric Co., Burlington, Vt.
PROJECT VULCAN RESEARCH AND DEVELOPMENT.
Progress rept. no. 43, 1 Oct-30 Nov 63. 31 Jan 64, 21p. Rept. no. 64APB14
Contract DA19 020ORD5455
Unclassified report

22. ORDNANCE

AD-437 919 Div. 22
OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
RF HAZARD DETECTOR ADAPTED TO THE LITTLEJOHN MISSILE SYSTEM,
by W. L. Strickland. 26 Feb 64, 20p.
Proj. 1A022601A093
AMC RA RK TR64 9 Unclassified report

Descriptors: (*Radiofrequency interference, Detection), (*Detectors, Hazards), (*Explosives initiators, Hazards), Explosives initiators, Electric detonators, Electromagnetic shielding, Artillery rockets, Radiofrequency, Safety, Temperature warning systems, Thermistors, Circuits, Exploding wires.

The thermistor type squib hazard detector was adapted to the LITTLEJOHN missile system to be used in an extensive RF hazard test at White Sands Missile Range. It is packaged inside the igniter case. The missile's squib circuit is unaltered electrically. The instrument, as it is designed and used, is sufficiently shielded to prevent any field effects on the detecting circuitry which might affect the validity of the data obtained. The detector measures temperature rise on the squib bridgewire and is not frequency sensitive. Its sensitivity is sufficient to detect a temperature rise on the bridgewire of the M-3 squib 57 db below the maximum no-fire level. A temperature rise on the bridgewire was detected when the LITTLEJOHN missile was subjected to a field strength as low as 0.013 volt per meter. This temperature change is much too small to be detected and measured by any other known instrumentation. (Author)

AD-438 011 Div. 22
OTS price $2.60

Human Resources Research Office, George Washington Univ., Washington, D. C.
AN EVALUATION OF A NEW RETICLE DESIGN IN GUNLAYING AGAINST FLASHES,
by David L. Easley. Mar 64, 24p.
Contract DA44 188AR02
Unclassified report

Descriptors: (*Reticles, Effectiveness), Gunnery, Fire control system components, Performance (Engineering), Performance (Human), Tanks (Combat vehicles).

The effectiveness of a grid-type reticle, graduated in turns of the azimuth and elevation controls of the M60 tank, was determined for gunlaying against enemy gun fire at night. Using the experimental reticle in a simulated firing situation, six experienced and seven inexperienced gunners localized and laid an M60 tank gun on each of 40 flashes. These Ss performed somewhat more accurately than a group of experienced gunners who used the standardreticle, but did not lay as quickly on the average. No group differences were significant. In the simulated situation, performance was better than it was in a field study. Factors which may have operated in the field study to degrade performance are discussed. (Author)

AD-438 014 Div. 22
OTS price $1.60

Army Natick Labs., Mass.
QUALITATIVE EVALUATION OF THE AIRDROP IMPACT CAPABILITY OF THE M44 INCAPACITATING CLUSTER,
by Maurice P. Gionfriddo. Oct 63, 19p.
ANL TM AEO 14 Unclassified report

Descriptors: (*Bomb clusters, Air drop operations), (*Air drop operations, Impact shock), Bags (Containers), Pallets, Drop testing, Packaging.

M44 Incapacitating Clusters packed in shipping boxes were stacked two high and subjected to critical airdrop impact conditions to evaluate their ability to withstand airdrop impact loadings when rigged with standard air delivery equipment and techniques. It was determined that the Clusters are capable of withstanding the airdrop impact loadings when using standard air delivery equipment and techniques. (Author)

AD-438 524 Div. 22
OTS price $4.60

Hudson Labs., Columbia Univ., Dobbs Ferry, N. Y.
DEVELOPMENT OF PRECISION PRESSURE DETONATED DEEP SOUND SIGNALS,
by Thomas Farrell. 26 Feb 64, 46p. Rept. nos. TR109, CU131 64
Contract Nonr26684
Unclassified report

Descriptors: (*Underwater ordnance, Explosive trains), (*Detonators, Sea water), Primers, Firing tests (Ordnance), Pressure, Design, TNT, Shear stresses, Tetryl, Underwater sound signals, Detonations, Underwater explosions.

The design of a precision pressure detonator and its use with various high explosives at detonation depths of 2500 to 14,000 feet is described. Description of the laboratory tests of the units and sea tests is also given. Results of the tests are summarized and analysed. Recommendations for application of the units as tools in experiments at sea are outlined. (Author)

AD-438 910 Div. 22
OTS price $1.60

Army Frankford Arsenal, Philadelphia, Pa.
PYROTECHNIC DELAY DEVICES FOR LOW ENERGY DETONATING CORD SYSTEMS,
by J. F. Kowalick. Apr 64, 20p.
AFA M64 26 1 Unclassified report

Descriptors: (*Delay elements (Explosive), Detonating cord), Pyrotechnics, Time, Seals (Stoppers), Design, Time-delay fuzes, Impact shock, Explosive trains, Detonations, Deflagrations, Aviation safety, Explosive actuators.

A study was initiated to survey the field of pyrotechnic delay devices as such devices pertain to systems where relatively low energy transfer is accomplished through detonating cord having a core of small amounts of high explosive. Detonating fuse delays developed for use in the blasting industry incorporate power trains of the sequence - high explosive, to deflagrating composition, to delay composition. Although such delays appear to be in common use, their delay times do not exceed approximately 300 milliseconds and their reliability has not been established. Furthermore, a design problem may exist in scaling up the delay time to the order of several seconds. Functional descriptions of these delays are presented. A method is presented for providing a complete seal between detonating cord and the delay device. References cited, although not all-inclusive, are indicative of current and past interest in this subject. (Author)

Instrumentation, Time, Signals, Calibration, Electric switches, Failure (Mechanics), Tests, Vibration, Impact shock, High-temperature research, Storage, Seals (Stoppers), Environmental tests, Electric currents, Resistance (Electrical), Electric insulation, Transportation, Experimental data, Research program administration, Acoustic torpedoes, Homing torpedoes, Surface-to-underwater, Navy.

The results obtained indicate that MIAD acceloswitches and accelerometers will reliably perform their intended function under the specified environmental conditions. In the few instances where difficulty was encountered, corrections were determined and necessary documentation changes were furnished to Picatinny Arsenal so that these difficulties will not recur in any subsequent production contract. It is apparent from the work done in this contract that variations in the nominal operating characteristics of these devices can be accommodated with only a minimum amount of additional engineering effort. The tolerances would, of course, need to remain in the same order of magnitude as those encountered on this program. (Author)

23. PERSONNEL AND TRAINING

AD-437 940 Div. 23, 28
OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland AFB, Tex.
YEARS OF EDUCATION AS A PREDICTOR OF TECHNICAL TRAINING SUCCESS,
by William B. Lecznar. Feb 64, 20p.
Proj. 7717, Task 771705
PRL TDR64 2 Unclassified report

Descriptors: (*Military training, Education), (*Psychometrics, Aviation personnel), Aptitude tests, Selection, Classification, Mathematical prediction, Effectiveness.

Previous findings on education variables as predictors of airman training and job success are reviewed as background for this new study. The predictive efficiency of years of education was assessed against final grade in 34 courses of technical training. By multiple regression techniques the percentage contributions were determined for education alone, aptitude tests alone, and combinations of aptitude measures and years of education to prediction of final school grade for each of the 34 samples of graduates. These data confirmed previous findings that education alone as a continuous variable was not as good a predictor as aptitude tests alone, and that years of education did not add appreciably to the level of prediction achieved by aptitude tests. Compared to the gains from an optimum combination of aptitude tests for each training criterion, any gain from adding the education variable proved practically unimportant. (Author)

AD-437 982 Div. 23, 16
OTS price $6.60

Coordinated Science Lab., Univ. of Illinois, Urbana.
SELF-DIRECTED INQUIRY IN CLINICAL NURSING INSTRUCTION BY MEANS OF THE PLATO SIMULATED LABORATORY,
by Maryann Bitzer. Dec 63, 67p. Rept. no. R184
Contract DA36 039AMC02208E
Unclassified report

Descriptors: (*Nurses, Education), (*Teaching machines, Nurses), Training devices, Effectiveness, Learning, Stimulation, Errors, Training, Digital computers, Digital systems, Control systems, Data processing systems, Tests.

AD-438 173 Div. 23, 26
OTS price $1.60

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
SYSTEMS RELIABILITY ENGINEERING GRADUATE CURRICULUM,
by Thaddeus L. Regulinski. 1964, 13p.
Unclassified report

Descriptors: (*Engineering, Education), (*Maintenance, Engineering), Reliability (Electronics), Analysis, Specifications, Maintenance tools, Decision making, Test methods, Scheduling, Management engineering, Maintainability, Mathematics, Theory, Social science, Personnel management, Training.

Systems Reliability Engineering Graduate Curriculum at the Air Force Institute of Technology is outlined by quarters in a dissertation which covers: Program Development, Mathematics Sequence, Engineering Sequence, and Socio Humanities Sequence. Each sequence is outlined in course and content coverage. The curriculum breakdown by quaters is presented with their respective courses and credit hours. Partial list of electives is also given. (Author)

AD-438 680 Div. 23
OTS price $9.10

Oklahoma Univ., Norman.
APPRENTICESHIP IN GREAT BRITAIN AND THE UNITED STATES,
by Richard P. Clevenger. 1964, 107p.
Unclassified report

Master's thesis.

Descriptors: (*Training, Great Britain), (*Training, United States), Job analysis, History, Wages, Printing, Time, Automotive industry, Labor, Industries, Economics, Effectiveness, Theory, Analysis, Performance tests.

AD-438 924 Div. 23, 28
OTS price $5.60

HRB-Singer, Inc., State College, Pa.
THE EVALUATION OF TROUBLESHOOTING STRATEGIES,
by L. B. Myers, R. G. Carter and R. E. Stover.
Jan 64, 53p.
Contract N61339 1231
NTDC 1231 1 Unclassified report

Descriptors: (*Military strategy, Maintenance), (*Training, Feasibility studies), Theory, Probability, Training devices, Reliability, Decision making.

It was the aim of this report to categorize and describe the many troubleshooting strategies in use and proposed, and to evaluate logically and experimentally these strategies to determine which are best suited to be taught to individuals of limited maintenance experience. The strategies (Reliability, and Conditional Probability), Syndrome Analysis, Signal Tracking (Signal Tracing and Signal Injection), Bracketing and Half-Split. Past literature demonstrated that Bracketing, Signal Tracking and Half-Split (in that decreasing order) were the most effective in terms of localization time, number of checks

Descriptors: (*Aircraft guns, Electric guns), Automatic weapons, Jet fighters, Gun components, Springs.

AD-439 426 Div. 22
OTS price $5.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
DYNAMIC FIRING OF THE ZUNI-PADA ROCKET,
by Carl Huber. 13 Dec 63, 51p.
Proj. 1 A 5 23801 A 297
AMC RA RT TM 63 65 Unclassified report

Descriptors: (*Rockets, Firing tests, Firing tests), Aircraft ammunition, Dynamics, Rocket launchers, Fins, Wind, Experimental data, Roll, Time, Velocity, Thrust, Misalignment, Sensitivity, Errors, Launching, Terminal ballistics, Ballistics.

This report covers the firing of six ZUNI-PADA rockets with fin sections modified to approach neutral wind sensitivity conditions. The test was conducted on 9 and 10 May 1963 at Army Missile Command Test Area 1. The ballistic data obtained are presented. (Author)

AD-439 451 Div. 22
OTS price $1.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
AN EMPIRICAL TECHNIQUE FOR IMPROVING AEROBEE-HI IMPACT PREDICTIONS,
by Gordon L. Dunaway. May 64, 17p.
DA Task 1G 6 50212A127 02
AERDA 138 Unclassified report

Descriptors: (*Sounding rockets, Terminal ballistics), Fin-stabilized ammunition, Wind, Mathematical predictions, Circular error probable, Ballistics, Equations, Data.

An empirical technique is presented for the improvement of Aerobee-Hi impact predictions. The variables used in the prediction equations are the theoretical wind displacements from the surface to 2,000 feet and from 2,000 to 100,000 feet. The results are presented in tabular form. (Author)

AD-439 488 Div. 22
OTS price $4.60

Ogden Air Materiel Area, Hill AFB, Utah.
CHARACTERISTICS OF HIGH CURRENT FIRING PULSES ON SQUIBS AND BLASTING CAPS,
by Kenneth A. Kartchner. Apr 64, 49p.
OOY TR64 103 Unclassified report

Descriptors: (*Radiofrequency pulses, Hazards), (*Electric detonators, Hazards), Firing circuits, Ignition, Detonations, Electric igniters, Electric primers, Explosives initiators, Explosions, Direct current, Arc welding, Electric currents, Radar transmitters, Radar pulses.

Charts were available which gave the low current characteristics of Du Pont squibs and blasting caps. These charts did not extend up to the desired current levels. The objective of the test was to extend these charts to include the high current characteristics. Also an attempt was made to determine the minimum time required to fire the squibs when using short high current pulses. From this test it was determined that the E-81 Blasting Cap could be functioned in 70 micro-seconds using 140 volts supplied by a direct current arc welder. The charts which were available did not include any curves showing what the squibs and blasting caps reaction would be when exposed to radar frequencies. To determine what this reaction would be both pulsed and continuous wave power was applied to the squibs and blasting caps. (Author)

AD-439 587 Div. 22, 25
OTS price $3.60

Kaman Nuclear, Colorado Springs, Colo.
INTERACTION OF ONE-DIMENSIONAL SHOCKS FOR EQUILIBRIUM AIR,
by Louis E. Bothell and Belmont S. Evans.
15 Jan 64, 34p. Rept. no. 689 64 5
Contract DA23 072AMC55Z
Unclassified report

Descriptors: (*Air, Shock waves), (*Shock waves, Air), Equations of state, Thermodynamics, Temperature, USSR, Enthalpy, Experimental data, Energy, Graphics, Atmosphere, Functions, Pressure, Propagation, Velocity.

This report presents a collection of charts which may be used for evaluating properties related to the state of air after the interaction of two one-dimensional strong shocks. The equilibrium properties of air in the region of interaction are given. An equation-of-state diagram which relates the properties of ''real'' air is also included. (Author)

AD-439 665 Div. 22, 25
OTS price $5.60

Drexel Inst. of Tech., Philadelphia, Pa.
ATTENUATION OF THE STRONG PLANE SHOCK PRODUCED IN A SOLID BY HYPERVELOCITY IMPACT,
by Pei Chi Chou, Harbans S. Sidhu and Lawrence J. Zajac. Feb 64, 52p. Rept. no. 125 5
Contract DA36 034ORD3672
Unclassified report

Descriptors: (*Hypervelocity projectiles, Impact shock), Shock (Mechanics), Attenuation, Solids, Entropy, Equations, Pressure, Least squares method, Differential equations.

The attenuation of strong plane shocks in solids produced by hypervelocity impact is studied, and two parametric equations are developed which describe the path of the shock front in the x,t-plane. These parametric equations were derived by considering the entropy change across the decaying shock and assuming that the characteristic lines behind the shock are straight lines. The equation of state is approximated by simple Hugoniot and isentrope equations. The same problem is also solved graphically by a stepwise characteristic method. A comparison of the graphical and analytical results shows that the simplifying assumptions made for the analytical solution are valid for both weak and strong shocks. (Author)

AD-439 689 Div. 22, 12
OTS price $6.60

Honeywell, Inc., Hopkins, Minn.
MIAD ACCELOSWITCH AND ACCELEROMETER.
Final rept.,
by J. A. Corbett and M. R. Olsen. 25 Apr 63, 69p. Rept. no. S68050
Contract DA11 022ORD3999
Unclassified report

Descriptors: (*Accelerometers, Performance (Engineering)), Guided missiles, Acceleration,

6 parameters to perform effectively with the result that cloud screening would take another significant step forward. Recommendations are presented to the effect that a cloud screening device may be built with the existing state-of-the-art techniques used in this study program. (Author)

AD-439 597 Div. 24
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CIRCUMFERENTIAL VERTICAL PERSPECTIVE AERIAL CAMERA,
by A. V. Bushuyev. 24 Mar 64, 5p.
FTD TT63 1004 Uncalssified report

Trans. from Patent No. 134930, (Appl. No. 662769/26), pp. 1-3, 12 Apr 60. From Russian text.

Descriptors: (*Panoramic cameras, Aerial cameras), Camera lenses, Design, USSR.

This circumferential vertical perspective aerial camera makes it possible, with one aerial shot, to include a larger area than conventional cameras. This is accomplished by using two objectives, one of which yields a vertical image, and the second, with the help of a double image prism, yields a perspective veiw of the terrain; also, the diaphragm has a revolving segmented, sagittal-shaped aperture. The camera can be used for mapping ice-floes, various types of hydrologic surveys (currents, ice drifts, sea swells), coordinating aerial survey routes and aerogeophysical surveys, and also for land and air navigation. (Author)

AD-439 728 Div. 24
OTS price $16.00

Xerox Corp., Rochester, N. Y.
DEVELOPMENT OF A CAMERA-SPEED XEROGRAPHIC PLATE.
Final rept. 1 Jul 59-30 Jun 62,
by A. Behringer, J. Bickmore, R. Blakney, L. Corrsin and J. Dessauer. 30 Jun 62, 241p.
Contract NOas59 6166c
Unclassified report

Descriptors: (*High speed photography, Electrophotography), (*Electrophotography, Photographic plates), Design, Preparation, Selenium alloys, Tellurium alloys, Cadmium compounds, Sulfides, Photoconductivity, Resolution, Sensitivity, Electrostatic fields, Electrostatic precipitation, Photoreceptors, Thermoplastics, Photographic images, Photographic recording systems.

Research leading to a high speed photographic system based on xerographic principles is described. A primary aim of the program has been to evaluate possibilities for increased speed through use of quantum gain in an imaging system. Success was achieved in demonstrating the use of gain in one such system. Investigations of the various system elements which led to this success are described in this report. This includes the photoreceptor, for which both variations of normal amorphous selenium plates and new plate materials of the CdS-CdSe family were tried. It includes the development method, for which a particular variety of thermoplastic deformation recording proved very promising. In addition to the primary aim of achieving gain, investigation of other parameters of interest in a photographic system were undertaken, such as resolution measurements and sensitometric determination. Efforts to improve panchromatic response and thereby to increase sensitivity to daylight were undertaken and led to significant improvements. (Author)

involved, and training ease. Because of the small amount of literature evaluating strategies, they were ranked in terms of decreasing theoretical potential; Half-Split, Bracketing, Signal Tracing, Syndrome Analysis, Conditional Probability and Reliability. In terms of feasibility of training, applicability to instruction and transfer potential, the Signal Tracking, Bracketing, and Half-Split strategies appear to be best suited for initial training in troubleshooting. These three strategies were experimentally evaluated. The results of the experiment suggest that Half-Split and Bracketing are superior to Signal Tracing since they take less time and checks to use. (Author)

AD-439 054 Div. 23, 16
OTS price $2.60

Oklahoma City ANA, Tinker AFB, Okla.
STUDIES OF AIR FORCE EXECUTIVES. IV. PRETESTING A TASK INVENTORY FOR EXECUTIVES (TIE) OF THE OCAMA,
by Helen V. Gunn. 17 Mar 64, 30p.
AFLC PRP EM63 8 Unclassified report

Descriptors: (*Supervisory personnel, Air force personnel), Management engineering, Inventory analysis, Management planning, Manpower studies, Education, Performance (Human), Tests, Psychometrics, Achievement tests.

A 100 item experimental Task Inventory for Executives (TIE) was derived and developed from Hemphill's (1960) factor analysis of executive tasks by Teller and Camm (1962). The inventory was pretested on 80 Headquarters USAF executives at four levels within nine USAF funstions (Teller and Camm, 1963), and on 66 Headquarters AFLC executives at three levels within eight AFLC functions (Bell and Wilfong, 1963). Results of both projects were analyzed on the basis of three sets of scores: 1. Criticality of Tasks, 2. Frequency of Performance, and 3. Performance of Tasks. (Author)

AD-439 648 Div. 23, 28
OTS price $1.60

Cincinnati Univ., Ohio.
A COMPARISON OF MODES OF PRESENTATION OF PAIRED-ASSOCIATES ON THE SUBJECT-MATTER TRAINER,
by Alfred B. Kristofferson, John A. Modrick and Ross L. Morgan. Jun 63, 19p.
Contract AF33 616 7674, Proj. 1710, Task 1710 04
AMRL M P46 Unclassified report

Report on Training, Personnel and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Training devices, Group dynamics), (*Group dynamics, Training), Learning, Feedback, Stimulation, Theory, Education, Psychology, Performance tests, Models (Stimulations), Memory, Experimental data.

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-437 959 Div. 24
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ON THE PROBLEM OF STEREOSCOPY IN THE BUBBLE CHAMBER. CORRECTION OF REFRACTION,
by D. Myager, tr. by Ingeborg V. Baker. 8 Apr 64, 15p.
RSIC 157 Unclassified report

Trans. from Revue de Physique (Bucarest), 4:2, pp. 235-243, 1959.

Descriptors: (*Bubble chambers, Photographic recording systems), Optical images, Refraction, Display systems, Trajectories, Errors, Stereoscopic photography, Photogrammetry, Rumania.

AD-438 037 Div. 24, 25, 30
OTS price $0.50

Naval Research Lab., Washington, D. C.
AN X-RAY FLUORESCENCE CAMERA.
Final rept..,
ax A. J. Pollard. 27 Dec 63, 6p.
Proj. SR007 08 04 0617
NRL 6061 Unclassified report

Descriptors: (*X-ray cameras, Fluorescence), (*X-ray spectroscopy, X-ray cameras), Optical analysis, Instrumentation, Design.

An x-ray fluorescence camera has been designed as a companion piece to the x-ray powder-diffraction camera. It is possible with this device to detect elements with an atomic number of 19 (potassium) and above. Quantitative determinations may be made using film-transmittance measurements similar to those used in quantitative analysis by powder techniques. The camera case has been constructed in such a way that it can be evacuated. A mechanism has been included which permits the examination of specimens just large enough to give ordinary powder patterns on film. (Author)

AD-438 418 Div. 24
OTS price $5.60

Litton Systems Inc., Waltham, Mass.
DENSITY DISCRIMINATION FOR PRINTER UTILIZATION STUDY.
Final rept.,
by A. Manevitz, J. L. Edie and G. S. Sebestyen.
Apr 64, 52p.
Contract AF30 602 3064, Proj. 6244, Task 624408
RADC TDR64 37 Unclassified report

Descriptors: (*Photographic processing equipment, Aerial reconnaissance), (*Aerial reconnaissance, Photographic processing equipment), Photographic printers, Military intelligence, Photographic intelligence, Military requirements, Density, Communication theory, Electron tubes, Photographic reconnaissance.

This report presents a summary of the work performed to study and investigate the capability of the Semi-Automatic Target Recognition Device (SATRD) for the determination of cloud cover on RADC supplied aerial reconnaissance film. Of 6 parameters used in this study, three were proved effective. Using only these 3 parameters, the percentage cloud cover was machine measured on 70% of the processed frames to an accuracy of 15%. In the remaining aerial photographs, dense (in the negative) water areas and distant terrain, as viewed through haze in oblique photography, were often misclassified as cloud area. Study of the results indicated that improvement would result from the installation of a logarithmic video amplifier and of a scanner tube with improved uniformity of light output and improved resolution. Preliminary results indicate that these two modifications to the SATRD would permit all

COUPLED CRYSTALS.
Final rept.,
by A. W. Saenz. 31 Jan 64, 5p.
Proj. RR002 01 41 4908
NRL 6031 Unclassified report

Descriptors: (*Magnetism, Theory), Oscillation, Hamiltonian, Matrix algebra, Single crystals, Magnetite.

Recently, a spin-wave theory has been constructed of the Holstein-Primakoff type applicable to exchange-coupled crystals with an arbitrary number of magnetic ions per primitive magnetic unit cell. In the present report, a simple, explicit, and general procedure is given for finding a complete set of normal spin-wave modes within the context of the above theory. A comparison of our procedure with the corresponding one of Wallace reveals that the present method is considerably easier to apply than his in practical computations involving an extensive class of complex exchange-coupled spin structures. (Author)

AD-437 958 Div. 25
OTS price $1.10

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ON THE PROBABILITY OF THE PHONONLESS TRANSITION IN THE IMPURITY CENTERS OF CRYSTALS,
by E. D. Trifonov, tr. by Walter Urusky.
8 Apr 64, 10p.
RSIC 156 Unclassified report

Trans. from Doklady Akademii Nauk SSSR, 147:4, pp. 826-828, 1962.

Descriptors: (*Crystals, Oscillation), Color centers, Impurities, Ground state, Absorption, Luminescence, Probability, Phonons.

AD-437 995 Div. 25
OTS price $8.60

Naval Research Lab., Washington, D. C.
SYSTEMATIC ERRORS IN ULTRASONIC PROPAGATION PARAMETER MEASUREMENTS. PART I. EFFECT OF FREE-FIELD DIFFRACTION.
Interim rept.
by V. A. Del Grosso. 29 Jan 64, 99p.
Proj. RF001 03 45 5251
NRL 6026 Unclassified report

Descriptors: (*Sound, Propagation), Tables, Errors, Ultrasonic properties, Absorption, Measurement, Velocity, Diffraction, Corrections, Graphics, Transducers.

Appreciable errors in sound speed and sound absorption determinations may be attributed to a neglect in applying appropriate corrections to situations closely approximating free-field conditions. The errors are shown to be more severe for the lower frequencies and shorter paths. For long paths the errors are generally such as to indicate an excessive loss in absorption measurements. In sound speed determinations over relatively long paths, the error leads to group velocities lower than the plane-wave phase velocity and to phase velocities, obtained by non-iterative techniques, higher than the plane-wave phase velocity. A reduction in the size of such errors (which are not errors if corrected for) may be made by a judicious selection of a particular differential path, although certain intervals may result in an increased error. This report contains, principally, graphs and tables of relative pressure and phase measurements as a function of the distance perpendicular to the transducer element. These data have been compiled for various transducer-crystal radii and for various wavelengths of operation. The tables, especially, are set up to permit accurate reading of diffraction corrections, particularly for absorption measurements in relatively low loss liquids or for sound speed measurements over relatively short paths or path differences. (Author)

AD-438 003 Div. 25
OTS price $2.60

Purdue U., Lafayette, Ind., School of Aeronautical and Engineering Sciences.
APPLICATION OF IRREVERSIBLE THERMODYNAMICS IN FINITE VISCOELASTIC DEFORMATIONS,
by George Lianis. Jan 64, 29p. Rept. no. A and ES 64 1
Proj. 3480
Unclassified report

Subcontract to Lockheed Propulsion Co., Redlands, Calif. Contract AF94 611 8539.

Descriptors: (*Viscoelasticity, Thermodynamics), Deformation, Irreversible processes, Nonlinear systems, Theory, Stresses, Strains (Mechanics), Integral transforms, Mathematical analysis, Equations.

Onsanger's principle of irreversible thermodynamics is applied to viscoelastic bodies subjected to finite deformation. The constitutive equation for small dynamic strains superposed on finite static deformation is used. The state of such deformation is considered as small deviations from an equilibrium reference state, the latter being that of equilibrium state of a material subjected to finite deformation in which the material is maintained for a long time. (Author)

AD-438 012 Div. 25
OTS price $1.60

Hebrew Univ., Jerusalem, (Israel).
A METHOD FOR DETERMINATION OF THE OPTICAL CONSTANTS OF THIN ABSORBING LAYERS,
by J. Harris and H. Weinberger, Aug 63, 16p.
Rept. no. TSN4
Contract AF61 052 279
AFCRL 63 918 Unclassified report

Descriptors: (*Metal films, Optical properties), Absorption, Light, Phase measurement, Equations, Refractive index, Digital computers, Analog computers, Intensity, Reflection, Nickel, Materials, Polarization, Interference, Optical filters.

A method has been developed by which the optical constants of an absorbing layer on an absorbing base can be determined. The amplitude and phase of the light reflected by such a ststem is a known function of the parameters - complex refractive indices of film and substrate, film thickness and gngle of incidence. But the equations are intractible and cannot be solved for refractive index of the film. The use of a search technique for an electronic computer makes the reverse calculation possible. Given suitable starting values, one can determine rather quickly the film index giving rise to measured values of the intensity and phase difference of the reflected light. Application of this method to thin layers of nickel black shows that the layer is inhomogeneous. The consequences of inhomogeneity are discussed. Many of the values for the optical constants of thin films which have been reported by other workers are,

25. PHYSICS

AD-437 906 Div. 25
OTS price $4.60

Airborne Instruments Lab., Deer Park, N. Y.
STUDY OF SOLID-STATE AND TRAVELING-WAVE MASER TECHNIQUES,
by J. A. DeGruyl, W. W. Heinz, S. Okwit and J. G. Smith. Mar 64, 42p.
Contract AF30 602 2989, Proj. 4506, Task 450602
RADC TDR64 115 Unclassified report

Descriptors: (*Masers, Solid state physics), Traveling wave tubes, Superconductivity, Surfaces, Resistance (Electrical), Tin, Superconductors, Magnetic fields, C-band, Ruby, Ferrites, Design, Magnets, Limiters, Germanium, Film.

The purpose of this program is to develop improved maser techniques and apply them to an operable breadboard maser system. The specific areas of interest include: Broad instantaneous maser bandwidth (500 Mc), Solid-state limiters to protect the maser from saturating, Superconducting solenoids to obtain the maser static field requirements, Possibility of using the superconducting tunneling effect to provide RF pumping power. During thi's report period, the major effort has been confined to broad-banding the maser and investigating limiters. A comb-type slow-wave structure test section, 3.3 inches long, has been designed and fabricated. (Author)

AD-437 935 Div. 25
OTS price $3.60

Electron Physics Lab., Univ. of Michigan, Ann Arbor.
SOLID-STATE MICROWAVE RESEARCH.
Interim scientific rept. no. 2, 1 Feb-1 Apr 64,
by D. C. Hanson, J. E. King, J. E. Rowe and C. Yeh. Apr 64, 33p. Rept. no. 06031 2S
Contract AF33 657 11587, Proj. 06031
Unclassified report

Descriptors: (*Solid state physics, Microwaves), Paramagnetic resonance, Electron, Phonons, Absorption spectrum, Quartz, Transducers, Microwave spectroscopy, High frequency, X-band, Bremsstrahlung, Electromagnetic waves, Mechanical waves, Propagation, Wave transmission, Plasma physics, Magnetic fields, Semiconductors, Scattering.

Various electron paramagnetic resonance experiments are reviewed in an effort to determine those materials most appropriate for parametric phonon interactions. One of the most promising materials is CdS:V(3+) since the nuclear spin of 7/2 associated with the V-51 isotope splits each fine line into eight lines. This results in a linewidth for absorption of approximately 700 gauss. The use of X-cut longitudinal quartz transducers resonant in the 5-40 mc region has allowed the observation of echoes up to 577 mc at room temperature. Similar results have been obtained up to 400 mc at liquid nitrogen temperature. The theory of stimulated Bremsstrahlung radiation from solids is developed further with particular emphasis on ionized impurity scattering. Experimental observation of significant powers at microwave frequencies can possibly be explained as a result of Raman scattering by optical phonon vibrational modes. Acoustic gain and velocity characteristics have been calculated for longitudinal mode excitation as a function of the velocity parameter u sub o/v. (Author)

AD-437 941 Div. 25
OTS price $2.60

Maryland U., College Park.
A MAGNETIC COMPRESSION EXPERIMENT FOR THE STUDY OF SHOCK WAVE STRUCTURES,
by G. Goldenbaum and E. K. Hintz. Dec 63, 22p.
Report no. SR2
Contract AF19 628 269, Proj. 8647, Task 864 702
AFCRL 64 293 Unclassified report

Descriptors: (*Magnetohydrodynamics, Shock waves), (*Shock waves, Magnetohydrodynamics), Magnetic pinch, Plasma medium, Plasma physics, Density, Gas ionization, Magnetic fields, Time, Ions, Protons, Cyclotron waves, Measurement.

The construction of the experimental apparatus for the investigation of the structure of hydromagnetic shock waves has been completed. By means of a technique developed in connection with so-called theta-pinch experiments a cylindrical plasma is produced with an internal magnetic field of variable magnitude. A fast rising external magnetic field is applied, which drives the plasma towards the axis thereby generating cylindrical shock waves. The density and the composition of the initial plasma, the magnitude of the internal magnetic field, the rise time and the maximum amplitude of the compressing field can be varied over a wide range. In particular it is possible to choose the parameters so that the ion mean free path in the shocked plasma is large compared to the ion cyclotron radius. (Author)

AD-437 952 Div. 25
OTS price $8.10

Oklahoma Univ. Research Inst., Norman.
RESEARCH DIRECTED TOWARD THE STUDY OF THE STRUCTURAL AND ULTRAVIOLET SPECTRA OF FREE RADICALS, MOLECULES AND MOLECULAR IONS USING THEORETICAL AND COMPUTATIONAL METHODS.
Final rept.
Feb 64, 85p.
Contract AF19 604 5576, Proj. 7635, Task 763507
AFCRL 64 123 Unclassified report

Descriptors: (*Nitrogen compounds, Hyperfine structure), (*Free radicals, Hyperfine structure), Oxides, Dioxides, Spectra (Visible & ultraviolet), Quadrupole moments, Dissociation, Energy, Molecules, Molecular structure, Theory, Hydrogen, Polarization, Chlorine compounds, Atomic orbitals, Ions.

An investigation was made concerning the energies and wave functions of the NO molecule with particular emphasis on the hyperfine structure constants and the ultraviolet spectrum. The magnetic hyperfine structure constants calculated from the self-consistent field molecular orbitals agree well with the experimental values and, except for the Fermi contact coupling term, are not much affected by the configuration interactions. On the other hand, appreciable amount of improvement on the dissociation energy was obtained by means of configuration mixing. The lambda-doubling constant of NO was calculated using the variation method of Das and Bersohn along with the SCF MO. The calculated value amounts to only about 25% of the experimental one. The large discrepancy is most likely due to the method of calculation rather than the inadequacy of the wave function. (Author)

AD-437 955 Div. 25
OTS price $1.10

Naval Research Lab., Washington, D. C.
NORMAL SPIN-WAVE MODES OF COMPLEX EXCHANGE-

Spectroscopic studies and improvements in crystal growth techniques continued for alkaline earth halide and halofluoride systems. The chemical reduction technique for obtaining divalent dysprosium in CaF2 has been developed to the point where several high-quality laser rods have been produced. Work continues on improving laser efficiencies by improved crystal cooling and pumping methods. The effects of temperature changes on the optical cavity modes have been computed. A double-elliptic reflector laser pumping system with two pump lamps has been built and provides a method of achieving significantly higher excitation levels than previous systems. Measurements of beam power as a function of output coupling have been made. A variable-bandwidth cavity optical modulator was built and its microwave properties determined. A method of producing true rotation of the plane of polarization in a modulator was developed and analyzed. The capacitance variations in photodiodes were studied to determine their usefulness in parametric photodiode detector applications. (Author)

AD-438 180 Div. 25
OTS price $9.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SUPERCONDUCTIVITY JANUARY-JUNE 1963: AN ANNOTATED BIBLIOGRAPHY,
comp. by Jack B. Goldmann. July 63, 118p. Rept. no. 6 90 63 79; SRB 63 5
Unclassified report

Descriptors: (*Superconductivity, Bibliographies), Superconductors, Conductivity, Transition temperature, Magnetic fields, Deformation, Theory.

Current theory, properties, and applications of superconductors as presented in the literature from January to June 1963, are covered in this annotated bibliography. The 242 entries, representing English and foreign language publications are listed alphabetically by author. To facilitate location of specific terms, author and subject indexes are included. This work is the third in a series of bibliographies reporting current publications in the field of superconductivity. (Author)

AD-438 181 Div. 25
OTS price $14.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
SUPERCONDUCTIVITY, 1961-1962: AN ANNOTATED BIBLIOGRAPHY,
comp. by Jack B. Goldmann. Apr 63, 206p. Rept. no. 6 90 63 43; SB63 33
Unclassified report

Descriptors: (*Superconductivity, Bibliographies), Transition temperature, Deformation, Thermal conductivity, Superconductors, Theory.

AD-438 227 Div. 25
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NEUTRALIZATION OF AN ION BEAM WITH ELECTRONS IN A MAGNETIC FIELD,
by V. N. Danilov. 17 Apr 64, 12p.
FTD TT64 176 Unclassified report

Descriptors: (*Ion beams, Magnetic fields), Ionic current, Space charges, Electrons.

AD-438 232 Div. 25, 6
OTS price $2.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
THE CRYSTAL-VIDEO RADIOMETER,
by Jack Copeland. 8 Jun 62, 22p.
AMC RA RR TM62 4 Unclassified report

Descriptors: (*Radiometers, Microwave equipment), Video amplifiers, Crystal detectors, Theory, Analysis, Temperature, Modulators, Frequency, Power, Mathematical models, Mathematical prediction.

A theoretical analysis iis made of a microwave radiometer which utilizes no predetection amplification. The minimum detectable temperature, defined as the temperature which results in an output signal-to-noise ratio of unity, is shown to be (pi/BM)(Tsub 0/2K tau sub 0) to the one-half power, where B is the predetection bandwidth, M is the crystal figure of merit, sub 0 is ambient temperature, K is Boltzmann's constant, and Tau sub 0 is the postdetection time constant. The predicted minimum detectable temperature for the millimeter wavelength region is about 50 K for a one-second postdetection time constant. Some experimental measurements are presented which show good agreement with the theoretical results. (Author)

AD-438 233 Div. 25, 30
OTS price $6.60

Aerojet-General Corp., Downey, Calif.
PARTICLE-SIZE DETERMINATION OF AEROSOLS BY THE PHOTOEXTINCTION TECHNIQUE,
by R. L. MacLean. 6 Mar 64, 64p. Rept. no. 0395 04 17SP
Contract DA18 108 405CML829
Unclassified report

Descriptors: (*Aerosols, Particle size), Determination, Distribution, Measurement, Photographic techniques, Errors, Theory, Instrumentation, Light transmission, Sedimentation, Photometers, Mathematical analysis, Equations, Collimators, Lenses, Calibration, Vibration, Intensity, Temperature, Cloud chambers, Density.

A photoextinction method has been developed to determine particle-size distributions of setting aerosols in a large test chamber. The theory of photoextinction by aerosol particles were explored and applied to a method of determining particle-size distributions from decay measurements based on Stokes' law. A photometric measuring apparatus was constructed and installed in the testing facility. Measurements of changes in light transmission were made for several dissemination experiments. Data reduction procedures were investigated with the data obtained. Errors in both theory and measuring instrumental parameters are discussed. (Author)

AD-438 259 Div. 25, 2, 30
OTS price $3.60

Harvard Coll., Cambridge, Mass. Observatory.
TEMPERATURE MEASUREMENTS FOR SHOCK HEATED POWDERED SOLIDS,
by E. M. Reeves and W. H. Parkinson. 14 Jan 64, 33p. Rept. no. SR1
Contract Nonr186648
Unclassified report

Descriptors: (*Shock tubes, Line spectrum), (*High-temperature research, Measurement), (*Astrophysics, Absorption spectrum), Calcium

in fact, average values for inhomogeneous layers. Such values have only limited significance in predicting the optical behaviour of inhomogeneous layers. (Author)

AD-438 043 Div. 25, 4
OTS price $1.60

Emory Univ., Atlanta, Ga.
MICROWAVE INVESTIGATION OF MOLECULAR STRUCTURE AND PROPERTIES.
Final rept. 1 Sep 60-31 Aug 63,
by James W. Simmons and J. H. Goldstein.
31 Aug 63, 11p.
Grants: DA ORD24; DA ARO D31 124G336, Projs. 009925001; ARO D2812P
AROD 2812 2 Unclassified report

Descriptors: (*Microwave spectroscopy, Molecular structure), Ethylenes, Allenes, Nitriles, Halogens, Chemical bonds, Distortion, Halides, Molecular rotation.

AD-438 051 Div. 25
OTS price $14.00

Maryland U., College Park.
INSTITUTE FOR MOLECULAR PHYSICS.
Final rept. 1 Sep 60-30 Nov 63.
30 Nov 63, 208p.
Contract Nonr59514
Unclassified report

Descriptors: (*Diatomic molecules, Absorption spectrum), (*Molecular spectroscopy, Quantum mechanics), Oxygen, Wave functions, Molecular properties, Curve fitting, Harmonic oscillators, Dipole moments, Upper atmosphere, N-body problem, Fluorine, Excitation, Bessel functions, Tables.

An evaluation is made of the absorption coefficient of a diatomic molecule in the case where the upper electronic state potential is represented by an exponential function and the lower state by a harmonic oscillator. The matrix element was evaluated exactly by numerical methods and approximately by the method of stationary phase. The results by these two methods are in good agreement with the experimental data on O2 and F2. Discrepancy at the short wave length side of the oxygen Schumann-Runge continuum persists for all methods of theoretical calculation. The abnormal appearance of the Schumann-Runge continuum can be explained by either the variation of the electronic dipole moment with internuclear separation or the interaction of two electronic states at region corresponding to the short wave length side of the continuum. (Author)

AD-438 053 Div. 25
OTS price $8.10

Defense Electronic Products, Camden, N. J.
CERENKOV MICROWAVE GENERATOR.
Interim technical rept. no. 1, Jun-Dec 63,
by J. Andersen, A. Boornard, J. M. Brumbaugh, J. J. Stekert and J. Vollmer. Apr 64, 83p.
Contract AF30 602 3061, Proj. 4519, Task 451904
RADC TDR64 103 Unclassified report

Descriptors: (*Cerenkov radiation, Generators), Microwaves, Electromagnetic waves, Radiofrequency generators, Radiofrequency power, Modulation, Superhigh frequency, Voltage, Electron beams, Dielectrics, Theory.

CW Cerenkov radiation has been produced by the interaction of a modulated flat ribbon electron beam with a scalar dielectric reactor. Measurements of the radiation were made at the fundamental frequency (6.33 gc) and at the second and third harmonics. The dependence of the generated power on accelerating voltage, bunch power, and beam current was examined. The dielectric reactor used consists of two hemicones having a dielectric coefficient of about 6 at 6.33 gc. For typical operating conditions of beam current = 0.3 ma, accelerating voltage = 70 kv and bunch power = 1 watt, approximately 7.5 x 10 to the minus sixth power watt of Cerenkov radiation was obtained at 6.33 gc. Based upon the calculated amplitude of the current at 6.33 gc, a value of 193 ohms is obtained for the interaction resistance. Because of the relatively poor collector efficiency, it is estimated that the Cerenkov power may actually have been as much as 100 times greater than the measured level. The characteristics of the measured radiation are in agreement with the theory developed during previous work. The potential well technique described in earlier reports was utilized in these experiments. Also given in this report are the results of analytical investigations of: (1) design considerations for a charge dissipative overlay; (2) the effects of finite beam width on power coupled into a Cerenkov reactor; and (3) thermal limitations of high power Cerenkov generators. (Author)

AD-438 169 Div. 25
OTS price $1.60

Benson (Robert W.) and Associates, Inc., Nashville, Tenn.
DISTRIBUTION OF LOSSES IN LONGITUDINALLY EXCITED VIBRATORS,
by Robert W. Benson and J. Ronald Chapman.
Mar 64, 17p.
Contract Nonr3995 00
Unclassified report

Descriptors: (*Vibrators (Mechanical), Attenuation), (*Vibration, Attenuation), Distribution, Transducers, Design, Measurement, Functions, Strain (Mechanics), Particles, Friction, Alloys, Frequency, Equations, Kinetic energy, Velocity, Density.

A study of the loss distribution in longitudinally excited vibrators was made for application to transducer design. The relative importance of losses related to longitudinal and shearing strains, the surface, and impedance transformations has been made. The experimental methods are described and analytical methods for the prediction of losses in various geometeries is given. The losses at changes in cross-section of a vibrator are found to behave in a predictable manner. (Author)

AD-438 170 Div. 25
OTS price $5.60

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
SOLID STATE LASER EXPLORATIONS.
Interim engineering rept. no. 2, 16 Jan 64-15 Apr 64,
by J. Collard, Z. J. Kiss, R. J. Pressley, F. Sterzer and T. Walsh. 1 May 64, 59p.
Contract AF33 615 1096
Unclassified report

Descriptors: (*Lasers, Scientific research), Solid state physics, Calcium compounds, Fluorides, Erbium compounds, Fluorine compounds, Oxygen compounds, Crystals, Spectroscopy, Materials, Pumping (Electronics), Dysprosium, Magnetic fields.

Attempts to operate a color-center pumped CaF2: ErOF crystal as a laser were unsuccessful.

Descriptors: (*Electrons, Aurorae), (*Aurorae, Electrons), (*Photomultipliers, Electrons), Detectors, Measurement, Fluorescence, Lithium compounds, Fluorides, Luminescence, Beta particles, Dosimeters, Detection, Electrons, Gamma rays, Uranium, Cobalt.

The limitations and capabilities of various detectors, especially photomultipliers are reviewed. Two methods, use of constant response fluors and use of choppers, are suggested for improvement of photomultiplier responses. A new type of detector is discussed and suggested for further development. The use of a LiF thermoluminescent dosimeter for detection of electrons is described. Experimental work leading to the present functioning system is presented. The response of this system to Cobalt 60 gamma rays, uranium beta-rays and to 7 kev electrons is given. (Author)

AD-438 428 Div. 25
OTS price $2.60

Sperry Gyroscope Co., Great Neck, N. Y.
ANALYSIS OF OPTICAL RESONATORS INVOLVING FOCUSING ELEMENTS,
by Stuart A. Collins, Jr., and Edward W. Cheatham. Dec 63, 28p. Rept. no. AB1108 0021; SR2
Contract AF19 628 2924, Proj. 4645, Task 454502
AFCRL 63 933 Unclassified report

Descriptors: (*Resonators, Optics), (*Optical instruments, Resonators), Electromagnetic fields, Focusing, Analysis, Resonance, Frequency, Stability, Equations, Functions, Lasers, Diffraction, Mirrors, Theory, Integrals, Polynomials.

The electromagnetic fields in optical resonators involving focusing elements are considered. The work is restricted to cases where the electromagnetic fields are small at the edges of any optical elements so that there is no significant aperturing. The paper presents the analytical solution for the fields across two reference surfaces (often the end mirrors) within the resonator, and describes graphically the fields inside and outside the resonator. The analytical solution uses Huygens' principle, but maintain generality in that the expressions relating the geometry of the particular optical resonator are left in terms of constants, which can be simply evaluated for the particular resonator. The expressions for the fields (over the reference surfaces), resonant frequencies, and stability conditions are given. The graphical description of the fields inside and outside the resonator is in terms of two experimentally observable variables: the radius of curvature of phase fronts and the spot size. A chart is utilized which permits a simple numerical presentation of those variables as a function of position along the the axis, and enables a simple calculation of the higher order transverse mode frequencies. (Author)

AD-438 449 Div. 25
OTS price $2.60

Naval Research Lab., Washington, D. C.
THE USE OF ULTRASONIC WAVES FOR STRESS DETERMINATIONS,
by E. W. Kammer and Irwin Vigness. 10 Apr 64, 27p.
Projs. F03 52; SR007 10 04, Task 891
Unclassified report

Descriptors: (*Ultrasonic radiation, Stresses), (*Stresses, Ultrasonic radiation), Structures, Measurement, X-rays, Crystal lattices, Experimental data, Acoustics, Elasticity, Velocity, Time, Transducers, Anisotropy, Shear stresses, Temperature.

AD-438 469 Div. 25
OTS price $2.60

General Dynamics/Fort Worth, Tex.
PLASMA ARC DEPOSITION FOR AEROSPACE APPLICATIONS,
by J. E. Halkias, H. R. Thornton and J. E. Burroughs. 15 Apr 64, 29p. Rept. no. FZM4044
Unclassified report

Descriptors: (*Plasma medium, Electric arcs), (*Electric arcs, Plasma medium), Materials, Coatings, Oxidation, Wear resistance, Erosion, Temperature, Control, Lubrication, Refractory materials, Plasma physics, Aluminum alloys.

The plasma-arc spray process has demonstrated potential as a material deposition method for the aerospace industry. Current applications involving the use of the plasma-arc spray technique are presented and their feasibilities discussed. The principal areas considered are coatings, including oxidation, wear, and erosion resistant, temperature control, and lubrication applications, fabrication of refractory metal shapes, plasma fusion surfacing, and controlled environment spraying. (Author)

AD-438 484 Div. 25
OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CAPTURE COEFFICIENTS OF GASES AT 77 K,
by R. F. Brown and E. S. J. Wang. May 64, 47p.
Contract AF40 600 1000, ARO Proj. SW2309, Task 895104
AEDC TDR64 37 Unclassified report

Descriptors: (*Condensation, Theory), (*Adsorption, Low-temperature research), Surfaces, Surface temperatures, Molecular weight, Surface area, Chemical bonds, Gases, Molecular properties, Cryopumping, Vacuum, Polarization.

The capture coefficients for thirteen common gases at 77K cryosurface temperatures are presented. Several parameters were employed for correlating these capture coefficients. It was found that generally the capture coefficient decreased with decreasing molecular weight, decreasing heat of condensation, and increasing Debye characteristic temperature. Hydrogen bonding in a molecule tended to increase the capture coefficient beyond the expected value. Two empirical parameters - one involving surface area of the molecule and the square root of the molecular weight, and the other involving surface energy of the molecule and the inverse square root of the molecular weight - appear to give the satisfactory correlation for capture coefficients. (Author)

AD-438 515 Div. 25
OTS price $8.10

Ion Physics Corp., Burlington, Mass.
P-N JUNCTION FORMATION TECHNIQUES.
Quarterly technical progress rept. no. 2, 2 Jan-2 Apr 64.
2 Apr 64, 86p.
Contract AF33 615 1097
Unclassified report

Descriptors: (*Semiconductors, Scientific research), Ions, Tests, Gases, Electric currents, Radiofrequency, Phosphorus, Mass

compounds, Aluminum compounds, Shock waves, Powder metals, Emissivity, Brightness, Sulfides, Argon, Atomic spectroscopy, Temperature.

Measurements were carried out to determine the temperature behind reflected shock waves for the case of an aerodynamic shock in argon containing a sample of powdered material. Time-resolved temperatures were measured photoelectrically using the brightness-emissivity method employing a short duration flash tube. The measured temperatures were found to be consistent and about 10% lower than the calculated temperature for pure argon, over a 9 electron volt range of atomic excitation energies, indicating that thermodynamic equilibrium was achieved. Calculated and measured densities for the atoms of the powder indicate that approximately 40% of the sample was uniformly distributed behind the reflected shock wave. (Author)

AD-438 407 Div. 25
OTS price $7.60

Allison Div., General Motors Corp., Indianapolis, Ind.
DIFFUSION OF POTASSIUM IN A LIQUID METAL CELL, by R. B. Wright. 21 Jan 64, 71p. Rept. no. 3814
Unclassified report

Descriptors: (*Potassium, Diffusion), (*Liquid metals, Diffusion), Boundary layer, Analysis, Equations, Configuration, Mathematical models, Voltage, Electric currents, Density, Fuel cells, Mercury, Power, Graphics, Vapors, Temperature.

This report presents the results of a study of potassium diffusion in the electrodes of a liquid metal cell (LMC) and its effect on cell performance. Experimental work and analytical analyses were initiated to (1) investigate diffusion properties of amalgams, and (2) evaluate the effect of diffusion rate on LMC performance. Analyses of diffusion characteristics were conducted to relate electrode-electrolyte interface concentrations with bulk electrode concentrations as a function of diffusion coefficients. These analyses were programmed into a computer mathematical model. Attempts were made to correlate the mathematical model with data obtained from cells operated at the Allison Research Laboratories. System performance is presented for two basic cell configurations. The first cell, designed for space systems, is identical to that presented in Reference 1. The second is based on electrode thicknesses, electrolyte resistance, and concentrations currently experienced in the laboratory. Supplementary data regarding (1) interface concentration equation, (2) diffusion in the LMC, (3) parametric analysis of the liquid metal fuel cell, and (4) determination of diffusion coefficient are presented. (Author)

AD-438 419 Div. 25
OTS price $9.60

Illinois Univ., Urbana Engineering Experimental Station.
MOLECULAR STORAGE AND TRANSFER OF ELECTROMAGNETIC ENERGY IN GASEOUS PLASMAS.
Final rept.,
by T. C. Marshall, R. A. Kawcyn, E. A. McLennan, J. Berlande and L. Goldstein. Apr 64, 114p.
Contract AF30 602 2650, Proj. 5561, Task 556103
RADC TDR63 275 Unclassified report

Descriptors: (*Plasma medium, Electromagnetic waves), (*Electromagnetic waves, Energy), (*Energy, Storage), (*Molecules, Storage), Plasma physics, Electron density, Atoms, Microwaves, Recombination reactions, Nitrogen, Oxygen, Hydrogen, Electric fields.

A laboratory study of the generation and recombination of atoms is presented. The background information consists of a discussion of various methods for producing atoms of nitrogen, oxygen and hydrogen by electrical discharges, with primary emphasis placed on the use of intense microwave electric fields. The body of the report deals with the results of investigations into the various loss mechanisms and reactions which affect the experimental use of atoms. These losses are of three types: (a) volume recombination in the bulk of the gas; (b) surface recombinations; and (c) electronic processes in the volume of the gas. Of particular interest is the value of the surface recombination coefficients for nitrogen atoms on various substances. Measurements have been made on Pyrex glass, clear fused quartz, and Alumina and Zirconia ceramics. In addition, the ratio of the number density of the atoms to that of the e ectrons has been studied as a function of high level radio frequency energy input. (Author)

AD-438 422 Div. 25
OTS price $1.60

Isomet Corp., Palisades Park, N. J.
CRYSTALS FOR OPTICAL MASER APPLICATIONS.
Final rept., 1 Jul 62-30 Jun 63,
30 Jun 63, 18p. Rept. no. 5066FR
Contract DA36 039SC90876, Proj. 3A99 21 001, Task 3A99 21 001 05
Unclassified report

Descriptors: (*Crystals, Lasers), (*Lasers, Crystals), Fluorescence, Strain (Mechanics), Ruby, Rods, Reflection, Dielectrics, Coatings, Dielectric films, Chromium, Metal coatings, Calcium compounds, Fluorides.

Crystals used in the initial experimentation at USASRDL to determine maser activity were examined mainly from the standpoint of their ability to exhibit fluorescence at certain wave lengths. Little consideration was given to processing the crystals to stringent tolerances of flatness, parallelismm, dimension and orientation, and introduction of strain. Continued effort to immprove ruby and other crystals for this application has shown a correlation between the shape, flatness, and parallelism of the end surfaces of the rods and maser activity. Improved reflectivity has also been obtained from the use of dielectric coatings rather than the commonly used metal coatings. Rubies containing 0.05% chromium emit photons with a wavelength of 6943 angstrom unit while rubies containing 0.5% chromium emit photons at two different wave lengths, 7009 and 7041 angstroms. Similarly calcium fluoride crystals with samarium and uranium impurities oscillate at wave lengths of 7080 and 25,000 angstroms respectively. Variations in the crystals and its processing can therefore affect maser activity. (Author)

AD-438 427 Div. 25
OTS price $2.60

Controls for Radiation, Inc., Cambridge, Mass.
IMPROVEMENT OF PHOTOMULTIPLIER RESPONSE AND DEVELOPMENT OF A DEVICE FOR MEASUREMENT OF Kev AURORAL ELECTRONS.
Final rept.,
by Richard C. McCall and Alfred C. Jasins.
27 Apr 64, 27p.
Contract AF19 628 2910, Proj. 7661, Task 766106
AFCRL 64 166 Unclassified report

AD-438 840 Div. 25
OTS price $8.60

Coordinated Science Lab., Univ. of Illinois, Urbana.
(No title).
Progress rept., Dec 63-Feb 64.
13 Apr 64, 93p.
Contract DA36 039AMC02208E, Proj. 3A99 25 004
Unclassified report

Descriptors: (*Scientific research, Reports), Surfaces, Atomic properties, Physics, Computers, Vacuum, Instrumentation, Artificial intelligence, Plasma physics, Magnetic fields, Vapor plating, Metal films, Superconductors.

AD-438 857 Div. 25, 15
Ots price $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
ON THE STABILITY OF THE EQUILIBRIUM SOLUTIONS OF THE PLANE RESTRICTED THREE BODY PROBLEM IN THE SENSE OF LIAPOUNOV.
Final rept.,
by Samuel E. Moskowitz. Apr 64, 28p. Rept. no. R64SD34
Contract AF49 638 814
AFOSR 64 0861 Unclassified report

Descriptors: (*N-body problem, Topology), (*Motion, Stability), Partial differential equations, Integrals, Gravity, Solutions, Differential equations, Numerical methods and procedures, Perturbation theory, Continuum mechanics, Celestial mechanics.

The stability of the five equilibrium solutions of the plane restricted three body problems is investigated in a topological sense of Liapounov. This aspect of motion has always been a subject of considerable interest primarily because the stability criteria were derived from linearizing the dynamical equations. It is shown that the question cannot be resolved by means of existing theorems governing the first approximation since these cases belong to an exceptional class which Liapounov had termed critical. The stability of the equidistant positions and instability of the collinear solutions are established however in accordance with a less restrictive definition by using surfaces which are formed from the Jacobi integral. (Author)

AD-438 865 Div. 25
OTS price $3.60

Microwave Associates, Inc., Burlington, Mass.
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS.
Quarterly progress rept. no. 5, 16 Nov 63-15 Feb 64,
by H. S. Maddix and J. Gregory. 15 Feb 64, 32p.
Contract DA36 039AMC00097E, Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Gas discharges, Microwave equipment), (*Cleaning, Gases), (*Dielectrics, Surfaces), Thermal diffusion, Helium, Neon, Argon, Theory, Quartz, Microwave spectroscopy, Solids.

A theoretical expression is derived for the clean-up of gas at the interface between a high power microwave discharge and a dielectric surface. Gas clean-up is described in terms of sticking times and the energy of activation for diffusion into the solid of gas trapped at the surface. Agreement was obtained between theory and experiment for the clean-up of helium, neon, and argon at a quartz surface. (Author)

AD-438 883 Div. 25
OTS price $1.10

Queens Coll., Flushing, N. Y.
THE SCHWARZSCHILD METRIC AND WHITEHEAD THEORY OF GRAVITATION,
by A. L. Harvey. Apr 64, 3p. Rept. no. TR1
Grant Nonr G00055 64
Unclassified report

Descriptors: (*Gravity, Theory), (*Relativity theory).

AD-438 893 Div. 25, 17, 30
OTS price $5.60

Oklahoma Univ., Norman Research Inst.
INVESTIGATION OF EDDY CURRENT TECHNIQUES IN ANALYZING AIRCRAFT STRUCTURES FOR FATIGUE DAMAGE.
Rept. for 12 Sep 63-31 Mar 64,
by E. M. Sims. 28 Apr 64, 54p.
Contract AF34 601 17360, OURI Proj. 1433 1
Unclassified report

Descriptors: (*Aircraft, Nondestructive testing), (*Structures, Fatigue (Mechanics)), (*Aluminum alloys, Fatigue (Mechanics)), Test equipment, Instrumentation, Stresses, Rupture, Tensile properties, Fracture Mechanics, Metal plates, Sheets, Electric currents, Magnetic fields, Loading (Mechanics) Vibration Steel Damage, Detection, Fractography, Photomicrography, Dyes, Penetration, Tables.

The primary objective of the program was to develop nondestructive methods of evaluating aircraft structures of aluminum alloys for fatigue damage. The approach to the problem was primarily through the use of eddy current instrumentation. Flat plate and sheet aluminum alloys, of types 7075-T6, 6061-T6, and 2024-T3, were supplied by OCAMA for the test program. Specimens were reverse stress cycled to varying degrees of damage and inspected with eddy current instrumentation. These were then pulled to rupture to correlate eddy current response to reduction in strength and ductility. (Author)

AD-438 948 Div. 25
OTS price $1.10

Israel Inst. of Tech. (Haifa).
ON DIRAC'S WAVE EQUATION IN A GRAVITATIONAL FIELD,
by Asher Peres. 20 Oct 63, 8p. Rept. no. TN4
Grant AF EOAR63 107
ARL 64 11 Unclassified report

Descriptors: (*Quantum mechanics, Hamiltonian), Wave functions, Charged particles, Gravity, Field theory.

The Dirac equation is investigated in the combined electric and gravitational field of a point charge in General Relativity. The wave functions are weakly singular at the origin, but still normalizable for a continuous range of the energy. The Hamiltonian, however, is not self-adjoint over the manifold of its own eigenstates, though it can be made self-adjoint by a suitable choice of its domain of definition. The theory, however, it unable to decide how the Hamiltonian should be defined, and what are the bound states. (Author)

AD-439 000 Div. 25
OTS price $1.10

Pennsylvania State Univ., University Park.
FIELD ION MICROSCOPE.

spectroscopy, Crystals, Thin films (Storage devices), Impurities, Spectroscopy, Plasma medium, Mass spectrum.

During the second quarter, the ion implantation apparatus was finished and tested using a variety of ion sources and feed gas combinations. While a high current source (100 microamps) was being developed, a radio frequency type ion source was used to obtain a phosphorus beam for cell production. Samples produced with this system were used to conduct extensive investigations on impurity motion, enhanced diffusion, profiles, annealing effects and leakage mechanisms. Results and conclusions of these investigations were partially tested by fabrication of cells. Cell (N on P) efficiencies varied from 6.2 to 9.3% with equal photon spectral response curves peaking as low as 5600 angstroms. Plasma deposition studies were conducted using two difference deposition sources and vacuum systems. Operation of the larger of these sources was investigated in detail, and a well controlled deposition mode for silicon was found. Silicon films (up to 6 microns thick) deposited on mica were quite uniform with very high resistivities (about 500 megohms/square). Post deposition thermal treatment and diffusion have been tried with these films to investigate film quality and junction formation. (Author)

AD-438 516 Div. 25, 4
OTS price $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
GROWTH AND CHARACTERIZATION OF SINGLE CRYSTALS OF RARE EARTH COMPOUNDS.
Quarterly technical rept. no, 3.
1964, 12p.
Contract AF49 638 1245
Unclassified report

Descriptors: (*Single crystals, Europium compounds), (*Europium compounds, Crystal growth), (*Crystal growth, Single crystals), Crystal structure, Crystal lattices, Epitaxial growth, Sulfides, Sodium compounds, Chlorides, Bromides, Calcium compounds, Fluorides, Impurities, Lanthanum, Transition temperature, Ferromagnetism, Electrical conductance, Paramagnetic properties, Solid solutions, Chromium alloys, Tellurium alloys, Crystal lattice defects, Resistance (Electrical), Molecular structure, Thorium compounds, Phosphides, Laboratory furnaces, Electron bombardment, Terbium alloys, Yttrium alloys, Zone melting.

Single crystalline films of EuS, having either (100) or (111) orientation, were prepared by vapor-deposition techniques. Three alkali halides, NaCl, NaBr, and CaF2 were found satisfactory as substrate materials for the epitaxial growth of EuS. A simple mode of epitaxy was observed for both the (100) and (111) cleavage surfaces. The conditions for the deposition and the quality of the films were critically examined. Some striking effects were noted of the doping of La on the electrical conduction of EuS. In addition to a marked decrease in resistivity at all temperatures between 4.2 and 300, La substitution also causes a slight increase of the Curie temperature. Ferromagnetic EuS with La as little as 1% exhibit metallic behavior in the electrical conduction below the Curie temperature. In all doped compounds, the resistivities drop by several orders of magnitude accompanying the paramagnetic approaches ferromagnetic transition. (Author)

AD-438 560 Div. 25
OTS price $1.10

Royal Coll. of Science and Technology, Glasgow (Scotland).
STEADY AND UNSTEADY MOTION IN MAGNETO-FLUID DYNAMICS.
Final technical rept.,
by D. C. Pack. 31 Dec 63, 8p.
Grant AF EOAR22 63
AFOSR 64 0725 Unclassified report

Descriptors: (*Magnetohydrodynamics, Motion), (*Electromagnetic waves, Propagation), Dynamics, Detonation waves, Deflagration, Cylindrical bodies, Electrical conductance, Shock waves, Conductivity, Analysis, Particles, Velocity, Magnetic fields, Gas ionization, Supersonic flow.

The one-dimensional propagation of a steady detonation wave and also of a deflagration wave in a tube closed at one end is studied for the situation in which the electrical conductivity jumps from zero to infinity across the leading shock owing to ionization of the gas. An analysis has been made of the jump relations for zero to infinity when the magnetic field is oblique and the upstream particle velocity and magnetic field are coplanar. Special attention is paid to switch-on and switch-off gas-ionizing shocks. A summary is given of work done on supersonic flow of electrically conducting fluid past a non-conduction wedge when there are four attached shocks. (Author)

AD-438 838 Div. 25
OTS price $4.60

Republic Aviation Corp., Mineola, N. Y.
STUDIES OF THE THEORY OF SPALLATION.
Final rept.,
by Walter F. Waldorf, Jr. 12 May 60, 45p.
Rept. no. MSD217 950
Contract AF29 601 1777, Proj. 5776, Task 58043
AFSWC TR60 20 Unclassified report

Descriptors: (*Spallation, Theory), Fracture (Mechanics), Time, Probability, Bonding, Bonded joints, Energy, Recombination reactions, Equations, Temperature, Plasticity, Experimental data, Explosive materials, Projectiles, Plasma jets.

This is the final report on the studies of the theory of spallation which have been performed by the Missile Systems Division of Republic Aviation Corporation. A literature survey on spallation has also been prepared as part of this contract and has already been submitted to AFSWC. The process of spallation and its separation into the two phenomena of stress-wave propagation in solid materials and fracture under dynamic loading are described in Section II. A brief account of the present state of knowledge concerning fracture, as well as the experimental data that form the basis of the theoretical development given in Section III and the fracture criterion that is to be used, is also given in Section II. A comprehensive theoretical derivation of Zhurkov's law of time-dependent fracture is presented in Section III. In Sections IV and V, the results of this analysis and other factors entering into fracture processes are discussed. A brief account of some experimental methods that could be used to study spallation is given in Section VI. (Author)

pressed thin-walled circular cylindrical shells. A rigorous calculation of the stability of the equilibrium of the model indicates that the snap-through phenomenon can be entirely absent when an imperfect shell is heated in a perfectly rigid testing machine. When the testing machine is sufficiently elastic, snap through will occur. It may take place at a temperature smaller than, equal to, or greater than T = epsilon sub cr/alpha, where epsilon sub cr is the theoretical critical strain of the perfect shell and alpha is the coefficient of expansion of the material of the shell, but the maximum stress produced in the imperfect shell will always be less than epsilon sub cr E, where E is Young's modulus of the material. (Author)

AD-439 077 Div. 25, 15
OTS price $2.60

Maryland Univ., College Park.
RELATIVISTIC PARTICLE DYNAMICS AND THE S-MATRIX,
by R. Fong and J. Sucher. July 63, 28p.
Technical rept. TR319
Grant AF AFOSR62 361
Unclassified report

Descriptors: (*Scattering, Relativity theory), (*S-matrix, Elastic scattering), Particles, Hamiltonian, Quantum mechanics, Transformations (Mathematics), Operators (Mathematics), Set theory, Perturbation theory.

Direct interaction theories are examined from the viewpoint of relativistic scattering theory and the associated concept of ''asymptotic covariance''. It is pointed out that with any two-particle Hamiltonian which has no bound states there can be associated a variety of representations of the Lie algebra of the inhomogeneous Lorentz group (IHLG). It is shown that the requirement of asymptotic covariance ensures both the covariance of the S-matrix and the existence of a unique representation of the IHLG to be associated with the relativistic two-particle system. The connection between the Lie algebra, the covariant form of the S-matrix, and the uniqueness of K, the generator of pure Lorentz transformations, is thereby clarified. The extension of these considerations to include bound states is made. The form of H given by Bakamjian and Thomas is shown to satisfy asymptotic covariance and, moreover, to be the most general form of interest from the viewpoint of relativistic scattering theory, thereby including as a special case a form of H suggested by Sudarshan. It is also proved that relativistic Hamiltonians of this type do not admit the usual notion of a coupling constant. (Author)

AD-439 209 Div. 25
OTS price $5.60

Technische Hochschule, Hannover (Germany).
EXCITATION OF PLASMA OSCILLATIONS BY SHOCK WAVES,
by Jurgen-Dietrich Welly. 1 Sep 63, 57p.
Contract AF61 052 161
AFCRL 63-577 Unclassified report

Descriptors: (*Plasma medium, Shock waves), (*Shock waves, Plasma medium), (*Oscillation, Excitation), (*Excitation, Oscillation), Plasma physics, Velocity, Distribution, Kinetic theory, Thermodynamics, Electrons.

The velocity distribution of the electrons within a plasma shock front is investigated by methods of the kinetic theory arranged in a manner to account for heavy deviations from thermodynamic equilibrium. The distribution function exhibits two peaks and becomes unstable with respect to electron oscillations, the shock wave being sufficiently strong (Mach number greater than approximately 6.5). The second peak is formed by runaway electrons, i.e. those fast electrons which transgress the shock front from the hot region. The frequencies, wave numbers, growth rates, phase and group velocities of the excited oscillations, and the influence of the Ohmic damping are calculated approximatively. The results are applied to non-thermal radio-frequency radiation of the sun. (Author)

AD-439 210 Div. 25
OTS price $2.60

Microwave Research Inst., Polytechnical Inst. of Brooklyn, N. Y.
TRANSIENT SOLUTIONS FOR A CLASS OF DIFFRACTION PROBLEMS,
by L. B. Felsen. 6 Mar 64, 28p. Rept. no. PIBMRI1209 64
Contract AF19 628 2357, Proj. 5635, Task 563501
AFCRL 64 173 Unclassified report

Descriptors: (*Diffraction, Theory), (*Harmonic analysis, Scattering), Transformations (Mathematics), Integrals, Green's functions, Dielectrics, Excitation, Electric fields.

The study of the fields excited by impulsive sources in layered media has been facilitated by a technique employed originally be Cagniard and Pekeris, and simplified subsequently be de Hoop. The procedure involves a reformulation of the time-harmonic solution so as to permit the explicit recovery of the transient result by inspection. In the present note, it is shown that this method may be applied conveniently to the inversion of a certain Sommerfeld-type integral which occurs frequently in diffraction theory, thereby unifying the analysis of a class of pulse diffraction problems. Illustrative examples include the transient response to a line source in the presence of a dielectric half space, a perfectly absorbing and perfectly reflecting wedge, and a unidirectionally conducting infinite and semi-infinite screen. The latter applications illuminate the role of surface waves in the impulsive solution. It is found, in contrast to the time-harmonic case, that a different behavior characterizes the space wave excited in a dielectric and conducting half plane by the incident field and by the edge discontinuity, respectively. (Author)

AD-439 213 Div. 25
OTS price $8.10

Selenia S. P. A., Rome, (Italy).
MICROWAVE INVESTIGATION OF THE DIELECTRIC WAVEGUIDE PROPAGATION BY MAGNETO-IONIC DUCTS.
Final technical rept. 1 Oct 58-31 Dec 62,
by Ing. A. Gilardini. Oct 63, 88p.
Contract AF61 052 145
AFCRL 64 219 Unclassified report

Descriptors: (*Microwaves, Waveguides), (*Waveguides, Microwaves), (*Dielectrics, Propagation), (*Propagation, Microwaves), Detection, Electromagnetic waves, Theory, Equations, Velocity, Experimental data, Plasma medium, Plasma physics.

The work performed under this Contract is described. Theoretical work includes: discussion of the basic quasi-static and exact theories for propagation along plasma slabs and columns in magnetic fields, derivation of Brillouin diagrams, calculations of electromagnetic power

Division 25 - PHYSICS

Status rept. 1 Jan-31 Mar 64,
by Erwin W. Mueller. Apr 64, 5p.
Contract Nonr65623, Proj. NR017 443
Unclassified report

Descriptors: (*Microscopes, Ions), Microscopy, Images, Intensity, Metals, Image intensifiers (Electronics), Tungsten, Emissivity, Helium, Neon, Gases, Gold, Silver, Copper, Tin, Iridium, Crystallography.

AD-439 003 Div. 25
OTS price $1.10

Georgia Inst. of Tech., Atlanta, Engineering Experiment, Station.
X-RAY DIFFRACTION STUDIES OF THERMAL MOTIONS IN CRYSTALS.
Quarterly status progress rept. no. 19, 1 Dec 63-29 Feb 64,
by R. A. Young. 14 Apr 64, 9p.
Contracts Nonr99100; Nonr99106, Proj. NR017 623; A389
Unclassified report

Descriptors: (*Crystals, X-ray diffraction analysis), (*Motion, Thermal properties), Crystal structure, Vibration, Temperature, Measurement, Materials, Silicon, Germanium, Polarization, Crystallography.

AD-439 007 Div. 25
OTS price $2.60

Brown Engineering Co., Huntsville, Ala.
DETERMINATION OF ELECTRON DENSITY DISTRIBUTION IN A PLASMA JET USING A LANGMUIR PROBE,
by S. H. Leong. Feb 64, 21p. TN R 89
Contract DA01 021AMC85Z
Unclassified report

Descriptors: (*Plasma jets, Electron density), (*Electron density, Plasma jets), Plasma sheath, Measuring devices, Reentry vehicles, Velocity, Shock tubes.

An elementary theory of the Langmuir probe is outlined to indicate the type of information obtainable by this technique. Difficulties arising in interpretation of data and instrumentation are discussed. (Author)

AD-439 010 Div. 25
OTS price $18.50

Joint Publications Research Service, Washington, D. C.
STUDIES IN THE PHYSICS OF ROUGHLY DISPERSED AEROSOLS.
11 June 63, 293p.
JPRS R3006D; ABL FD2 3742 T 38 1, TR no. 815
Unclassified report

Descriptors: (*Atmospherics, Physics), (*Aerosols, Physical properties), (*Clouds, Microanalysis), Sampling, Charged particles, Atmospheric motion, Atmospheric precipitation, Electrostatics, Mathematical analysis, Differential equations.

AD-439 013 Div. 25, 17
OTS price $2.60

Stanford Univ., Calif.
REPEATED BUCKLING OF CIRCULAR CYLINDRICAL SHELLS AND CONICAL FRUSTA BY AXIAL COMPRESSIVE FORCES,
by W. H. Horton and S. C. Durham. Nov 63, 24p.
Rept. no. SUDAER175
Contract AF49 638 1276
AFOSR 64 0890 Unclassified report

Descriptors: (*Conical bodies, Buckling (Mechanics)), (*Cylindrical bodies, Buckling (Mechanics)), Structural shells, Model tests, Force, Compressive properties, Loading (Mechanics), Deflection, Stresses, Brass, Steel, Nickel, Failure (Mechanics).

The results are reported of a series of tests made to determine the buckling behavior of circular cylinders and conical shells under repeated axial compression. It is shown that if the only restriction placed on buckle depth is that buckle development is such that no permanent gross strain results after load removal, then the buckle load progressively falls with repeated application until a constant lower bound is reached. This effect is considered to be due to the formation of plastic hinges along the edges of the buckles. (Author)

AD-439 018 Div. 25
OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
RUPTURE SURFACES OF THICK SPHERICAL SHELL UNDER INTERNAL PRESSURE,
by Sadia M. Makky. Apr 64, 27p. Rept. no. MN 339; D1 82 0336
Unclassified report

Also available from the author.

Descriptors: (*Spheres, Fracture (Mechanics)), (*Structural shells, Rupture), Plasticity, Theory, Tensor analysis, Partial differential equations, Pressure, Stresses, Creep, Strain (Mechanics).

The theory of fracture on surfaces of instability has been applied to predict, analytically the possible surfaces on which a thick-walled spherical shell will ruputure. The shell is assumed to be made of an incompressible, rigid-perfectly plastic material satisfying either Tresca or von Mises yield criterion. Furthermore, it is assumed that the internal pressure is sufficient to render the shell material fully in the plastic state. Under these conditions, it is shown that the spherical shell is subject to ruputure on radial planes whose intersections with the inner and outer surfaces of the shell are arcs of great circles. (Author)

AD-439 043 Div. 25
OTS price $2.60

Stanford Univ., Calif.
A NON-LINEAR MODEL STUDY OF THE THERMAL BUCKLING OF THIN ELASTIC SHELLS,
by Nicholas J. Hoff. Oct 63, 26p. Rept. no. SUDAER173
Contract AF49 638 1276
AFOSR 64 0888 Unclassified report

Descriptors: (*Elastic shells, Buckling (Mechanics)), (*Cylindrical bodies, Buckling (Mechanics)), Structural shells, Loading (Mechanics), Deflection, Stability, Weight, Models (Simulation), Temperature, Thermal expansion, Strain (Mechanics), Elasticity, Load distribution, Stresses.

Analysis of the simple model proposed yields equilibrium curves in agreement with those obtained by other investigators for axially com-

AD-439 365 Div. 25
OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 8. SOLID STATE.
Quarterly progress rept., 1 Jan-31 Mar 64.
15 Apr 64, 17p.
Contract AF19 628 500
ESD TDR64 47 Unclassified report

Descriptors: (*Solid state physics, Scientific research), Lasers, Materials, Solids, Raman spectroscopy, Magnetism, Resonance, Research program administration.

AD-439 374 Div. 25
OTS price $2.60

Technical Research Group, Syosett, N. Y.
RADIATION OF SOUND FROM A CIRCULAR DISK WITH A UNIFORM PRESSURE DISTRIBUTION,
by Visvaldis Mangulis. Apr 64, 28p. Rept. no. 142TN64 2
Contract Nonr438500
Unclassified report

Descriptors: (*Sound transmission, Numerical analysis), (*Disks, Sound transmission), Acoustic impedance, Boundary value problems, Series, Bessel functions, Diffraction, Acoustics, Cavitation.

The velocity potential for a flexible circular disk with a uniform pressure distribution in an infinite rigid planar baffle is calculated. The problem is mathematically similar to the diffraction of a plane wave by a circular aperture. The velocity of the disk which produces the uniform pressure becomes infinite at the edge of the disk. The mixed boundary value problem is solved by expanding the velocity of the piston in an infinite Dini series of Bessel functions; to find the coefficients in the series one has to solve an infinite set of linear equations. For numerical computations the infinite set is approximated by a finite set of equations. Numerical results for the sound pressure in the far field and the near field, the radiation impedance, and the velocity distribution over the piston are presented. It is shown that the cavitation limited power output from the constant pressure disk exceeds the output from a disk with a constant velocity. (Author)

AD-439 404 Div. 25
OTS price $2.60

Institute of Tech., Univ. of Minnesota, Minneapolis.
SURFACE AND VOLUME SOUND FROM BOUNDARY LAYERS,
by William C. Meecham. 1964, 25p.
Contract Nonr71040
Unclassified report

Descriptors: (*Turbulent boundary layer, Sound), Sound transmission, Boundary layer, Noise.

It is shown for turbulent boundary layers that surface, dipole sound is in general much less than volume, quadrupole sound. This is so for two reasons: first, the relative volume sound is increased by several orders of magnitude because of shear-flow enhancement within the boundary layer. Secondly, the dipole sound intensity is shown, through the use of an image argument similar to that used in the discussion of flat boundary layers, to be reduced by a factor of (L/R) square where L is the boundary layer thickness and R is the surface radius of curvature. A discussion of irregular surface bumps shows that such imperfections may be the source of significantly large dipole sound. (Author)

AD-439 429 Div. 25
OTS price $4.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THEORETICAL CALCULATION OF CROSS-SECTIONS OF IMPORTANCE TO ATMOSPHERIC DEIONIZATION,
by C. W. Baulknight and M. H. Bortner. Jan 64, 47p. Rept. no. R64SD12
Contract AF19 604 8820
Unclassified report

Descriptors: (*Atmosphere, Recombination reactions), (*Recombination reactions, Atmosphere), Ionization, Probability, Dissociation, Energy, Integrals, Thermal properties, Particles, Ions, Quantum mechanics, Neutralization, Electrons.

Ion-ion recombination reactions play a major role in atmospheric deionization. However, there are little or no data available on the rate constants for reactions of interest of this type. A program was, therefore carried out to obtain order-of-magnitude values for rate constants for certain of these reactions. The technique use for these calculations was a curve-crossing technique similar to that used by Magee but with certain modifications. It essentially involved the calculation of the Hamiltonian for the process, the use of this Hamiltonian in the calculation of the probabilities of transition at the curve-crossing points and the use of the probabilities in the calculation of the cross-sections and rate constants. The report also includes a discussion of methods which have been reported in the literature for calculations on the dissociative recombination type of reaction. (Author)

AD-439 435 Div. 25
OTS price $5.60

RAND Corp., Santa Monica, Calif.
NON-LINEAR INTERACTIONS OF ELECTROMAGNETIC FIELDS WITH MATTER,
by H. T. Yura. May 64, 52p. Memo RM4093PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Electromagnetic fields, Gases), (*Lasers, Absorption), Atomic properties, Quantum mechanics, Photons, Propagation, Nonlinear systems, Green's function, Ground state, Resonance, Conductivity, Theory.

This study is an introduction to non-linear interactions of the electromagnetic field with an isotropic, homogeneous medium. A quantum mechanical theory of two-photon propagation is presented, and an integral equation for the two-photon Greens function is derived. The classical non-linear macroscopic Maxwell equations, which take into account double-photon effects, are derived and the phenomenological parameters which appear in these equations are related to their corresponding quantum mechanical parameters. In particular, the non-linear polarizability and conductivity of an atomic system are derived. Numerical estimates of the non-linear terms are given and application of this theory to the absorption of laser light in an atomic medium is discussed. In particular, it is argued that in the case of a double resonance, the non-linear absorption rate can be larger than the linear absorption rate. (Author)

flows, extension of theory to the case of external metallic walls, comparison with whistler-type characteristics, approximate evaluations of propagation features in non-uniform and in warm plasma slabs. Experimental work includes: detection of plasma guided signals, measurements of their amplitudes, phase and group velocities, check measurements of the electron density. Most of the experimental results are interpreted in terms of the discussed theory. (Author)

AD-439 221 Div. 25
OTS price $8.10

Little (Arthur D.) Inc., Cambridge, Mass.
SUPERCONDUCTIVE EFFECTS IN THIN FILMS.
Final rept. Jan 62-Mar 64,
by S. Shapiro and E. J. McNiff, Jr. Mar 64, 83p.
Contract AF33 657 7915, Proj. 4460, Task 446004
AL TDR64 46 Unclassified report

Descriptors: (*Thin films (Storage devices), Superconductivity), (*Superconductivity, Thin films (Storage devices)), Radio frequency, Detection, X-band, Microwaves, K-band, Mixers (Electronic), Quantum mechanics, Tunneling (Electronics).

This report covers a two year effort in an applied research program to investigate the feasibility of using the superconductive properties of certain thin film configurations to perform electronic functions. Particular attention was paid to the phenomenon of electron tunneling between superconductors as exhibited in suitably prepared thin film structures. Stimulated by the extreme non-linearity of the I-V characteristic of a tunneling sample, investigations were carried out involving the use of such samples as detectors and mixers at rf and microwave frequencies. Detection experiments were carried out at 2 Mc, and the characteristic analyzed successfully by a simple model based upon an equivalent circuit representation of the tunnel structure. Use of a tunneling sample as an RF oscillator and amplifier by other workers is discussed and comments are made on the suitability of tunneling samples for practical applications. (Author)

AD-439 229 Div. 25
OTS price $2.60

Aerospace Information Div., Washington, D. C.
EXPERIMENTAL INVESTIGATION OF THE EFFECTS ON HEAT EXCHANGE OF THE CONFIGURATION OF A BODY AND OF THE INCIDENT ANGLE OF AN AIR CURRENT,
by V. K. Shchitnikovi. 1960, 25p.
AID T64 21 Unclassified report

Presented at the Conference on Heat and Mass Exchange sponsored by Belorussian Academy of Sciences, the Ministry of Higher and Secondary Special Education, USSR: The Academy of Construction and Architecture, USSR and the Institute of Mechanics, AS USSR. The conference was held in Minsk in 1961.

Descriptors: (*Heat transfer, Convection), (*Geometric forms, Heat transfer), USSR, Spheres, Cylindrical bodies, Conical bodies, Disks, Structural shells.

AD-439 233 Div. 25
OTS price $4.60

Purdue Research Foundation, Lafayette, Ind.
SEMICONDUCTOR RESEARCH.
Semiannual rept. 1 Oct 63-31 Mar 64.
31 Mar 64, 44p. Rept. no. PRF 3324
Contract DA31 124AROD17
Unclassified report

Descriptors: (*Semiconductors, Scientific research), Electrical properties, Low temperature research, Anisotropy, Distribution, Oscillation, Hydrostatic pressure, Excitation, Gallium compounds, Arsenides, Infrared radiation, Absorption.

AD-439 244 Div. 25
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
SIMULATION OF A THIN PLASMA SHEATH BY A PLANE OF WIRES,
by K. E. Golden and T. M. Smith. 30 Mar 64, 37p. Rept. no. TDR269 4280 10 3
Contract AF04 695 269
SSD TDR64 29 Unclassified report

Descriptors: (*Plasma sheath, Simulation), (*Simulation, Wire), Plasma physics, Reflection, Plasma medium, Experimental data, Electrical impedance, Surfaces, Frequency, X-band, Theory, Waveguides.

A method of simulating a thin plasma sheath of the type encountered in some aerospace applications by using a single plane of equally spaced wires is described. It is shown that the surface impedance of such a periodic structure can be made equal to that of a thin plasma sheath. In this treatment, the respective surface impedances are related through three dimensionless parameters. A simple technique for obtaining high losses is also discussed, whereby collision frequencies in the neighborhood of the operating frequency are relizable. Experimental data, including both the lossy and lossless cases, are compared with the theoretical model in the X-band region. (Author)

AD-439 328 Div. 25, 15
OTS price $7.60

Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
INSTABILITY OF THICK ELASTIC SOLIDS,
by Chester B. Sensenig. June 63, 74p. Rept. no. 310
Contract Nonr28542; Grant AF AFOSR62 359
Unclassified report

Descriptors: (*Solids, Elasticity), Compressive properties, Deformation, Pressure, Strain (Mechanics), Stresses, Cylindrical bodies, Transformations (Mathematics), Polynomials, Stability, Nonlinear systems, Theory.

The stability of equilibrium of several homogeneous isotropic elastic solids is investigated. The problems considered are treated by making use of a nonlinear three-dimensional theory of elasticity. No restrictive assumptions are made concerning the thickness of the bodies, and the displacements and strains are assumed not to be small. The strain energy function, from which the stress-strain relations come, could in principle be chosen arbitrarily. In this paper a special, but for many materials reasonable, choice for the strain energy function is made. In each problem a simple solution is derived which satisfies all conditions of the exact nonlinear theory. A small perturbation with respect to this simple state is then made, and the question is raised as to whether other possible equilibrium states exist within the framework of the basic theory. Critical pressures and strains needed to cause such buckled solutions are found, together with the corresponding modes of buckling. (Author)

property that any two implies the third. The generalization to particles with spin is discussed and some remarks are made on the application to complex potentials (optical model), where time-reflection invariance implies only reciprocity. The theory of resonance scattering, in which the target and the incident particle can form a compound system of finite lifetime, is discussed, particularly as it applies to the scattering of electrons by molecules at energies close to the resonant energies of the negative molecular ion. (Author)

AD-439 604 Div. 25
OTS price $9.60

Naval Ordnance Lab., White Oak, Md.
THE EFFECTS OF ELECTRONIC EXCHANGE ON THE EFFICIENCY OF VIBRATIONAL EXCITATION BY MOLECULAR COLLISIONS,
by Irving Korobkin. 9 Sep 60, 112p.
Proj. NOL363
NOL ARR115; NAVWEPS 7268
Unclassified report

Descriptors: (*Electrons, Excitation), (*Excitation, Electrons), (*Molecules, Vibration), (*Vibration, Molecules), Energy, Theory, Valence, Protons, Hydrogen, Ions, Elasticity, Electromagnetic waves, Quantum mechanics, Analysis, Mathematical models, Distortion.

A theoretical study has been made of the mechanism for the transfer of traslational energy into internal energy by moleuclar collisions. In particular, the research considered the interaction between molecules which can combine chemically to form a covalent bond. Such an interaction is typified by the collision of a proton and a diatomic hydrogne molecule which can combine to form a stable hydrogne molecule ion, and exhibits all the desired characteristics of the phenomenon under study with a minimum of extraneous effects. (Author)

AD-439 605 Div. 25, 14
OTS price $2.60

Goodyear Aerospace Corp., Akron, Ohio.
SOLAR REFLECTOR FOAMING TECHNOLOGY.
Quarterly progress rept. no. 5, 1 Nov 63-31 Jan 64.
Feb 64, 21p. Rept. no. GER11494
Contract AF33 657 10165, Proj. 3145, Task 314502
Unclassified report

Descriptors: (*Mirrors, Space borne), Vacuum, Foams, Physical properties, Space environmental conditions, Simulation, Reflectors, Reflection, Manufacturing methods, Thermal conductivity.

This fifth quarterly progress report describes the effort and accomplishments on the Solar Reflector Foaming Technology Program being conducted under the direction of the U.S. Air Force, Research and Technology Division, AFSC. The period covered is from 1 November 1963 through 31 January 1964. (Author)

AD-439 609 Div. 25
OTS price $3.60

Stanford Univ., Stanford, Calif.
REFLECTIONS IN AND FROM ONE-DIMENSIONAL REGULAR AND IMPERFECT POINT LATTICES,
by Harold Levine. 15 Apr 64, 39p. Rept. no. TR1
Contract Nonr22574, Proj. NR041 313
Unclassified report

Descriptors: (*Mechanical waves, Theory), (*Waveguides, Wave functions), (*Wave transmission, Integral transforms), Mathematical analysis, Integral equations, Transformations (Mathematics), Quantum mechanics, Motion, Differential equations, Crystal lattices.

This report accounts investigations into the utility of integral equation and transform procedures for systematizing an analysis of waves and their propagation through, and reflection from, media endowed with a periodic structure. Attenuation is confined to one-dimensional wave motions in a point lattice; for simplicity and concreteness, we may envisage a stretched string which is periodically loaded with identical point masses and is executing small transverse vibrations. The capabilities of an integral equation-transform analysis are illustrated with reference to wave motions along infinite strings that are loaded on but half of their total extension; in particular, expressions are obtained for the reflection coefficient of waves incident upon the loaded portion in cases where the latter contains identical masses, an alternating sequence of two distinct masses, or an isolated departure from regularity in the mass spectrum. (Author)

AD-439 614 Div. 25
OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
ELASTIC AND PLASTIC STRESS EQUATIONS FOR HOLLOW CYLINDERS AND SPHERES SUBJECTED TO INTERNAL AND EXTERNAL PRESSURE,
by V. C. D. Dawson. 4 Feb 60, 32p.
NOL BRR18; NAVORD 6786
Unclassified report

Descriptors: (*Stresses, Equations), (*Elasticity, Plasticity), (*Cylindrical bodies, Pressure), Theory, Spheres, Failure (Mechanics), Strain (Mechanics), Distribution, Design, High-pressure research.

The equations used to design high-pressure vessels, both cylindrical and spherical, are given. Where strength requirements are not severe, the elastic equations, together with the distortion enerby theory of failure, are used. For chambers having high-pressure requirements, it is necessary to resort to a shrink fit or autofrettage construction. The equations for these processes are derived herein. A short discussion of bursting strength of high-pressure chambers is also included. (Author)

AD-439 647 Div. 25
OTS price $3.60

Purdue U., Lafayette, Ind.
ON THE EQUIVALENCE OF POLYNOMIAL AND FUNCTIONAL FORMS OF CONSTITUTIVE EQUATIONS FOR A CLASS OF LARGE DEFORMATIONS,
by K. C. Valanis. Nov 63, 31p. Rept. no. 63 10
PRF Proj. 3480
Unclassified report

Subcontract to Lockheed Propulsion Co., Redlands, Calif. Contract AF94 611 8539.

Descriptors: (*Polynomials, Functions), (*Deformation, Mathematical analysis), Stresses, Elasticity, Viscosity, Relaxation time, Viscoelasticity.

The special class of small, time-dependent deformations superposed on large static deformations is considered. For this particular class, it is shown that the constitutive relations obtained from a particular polynomial formulation

Division 25 - PHYSICS

AD-439 436 Div. 25
OTS price $8.60

Coordinated Science Lab., Univ. of Illinois, Urbana.
SPIN RELAXATION OF OPTICALLY PUMPED CESIUM,
by Frank A. Franz. Apr 64, 100p. Rept. no. R202
Contract DA36 039AMC02208E, DA Proj. 3A99 25 004
Unclassified report

Doctoral thesis.

Descriptors: (*Pumping (Electronics), Cesium), Relaxation time, Nuclear spins, Polarization, Diffusion, Neon, Argon, Krypton, Alkali metals.

Spin relaxation of optically pumped cesium vapor has been measured as a function of buffer gas pressure for various inert gases. Disorientation cross sections have been found to be 5.3 x 10 to the minus 24th power sq cm for neon, 8.0 x 10 to the minus 23rd power sq cm for argon, 2.1 x 10 to the minus 21st power sq cm for krypton, and 4.6 x 10 to the minus 20th power sq cm for xenon. The diffusion coefficients of cesium in nenon and argon were found to be 0.40 sq cm sec and 0.23 sq cm sec, respectively. Disorientation cross sections and diffusion coefficients have also been determined for molecular nitrogen. The agreement of these values with existing theory is discussed. (Author)

AD-439 438 Div. 25
OTS price $2.60

Coordinated Science Lab., U. of Illinois, Urbana.
ELECTRON COLLISIONS IN NEON PLASMA,
by C. L. Chen. Apr 64, 22p. Rept. no. R201
Contract DA36 039AMC02208E, DA Proj. 3A99 25 004
Unclassified report

Descriptors: (*Plasma medium, Neon), (*Neon, Plasma medium), (*Electrons, Neon), Energy, Momentum, Atoms, Temperature, Theory, Frequency, Gases, Gas ionization, Microwaves, Ions, Density.

The momentum transfer collision frequencies of electrons with neon ions and neutral atoms were measured in a decaying neon plasma over the temperature range from 200 to 600 K. The temperature-density dependence of the electron-ion collision frequency and the energy dependence of the momentum transfer cross sections of electrons with neon atoms was determined. (Author)

AD-439 453 Div. 25
OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
FLUORESCENCE PUMPING OF LASERS.
Progress rept. no. 1, July 62-Oct 63,
by Julian L. Thompson. Apr 64, 15p.
NOTS TPR356; TP 3506 Unclassified report

Descriptors: (*Lasers, Fluorescence), Light, Discharge tubes, Dyes, Solutions, Powders, Design, Absorption spectrum, Ruby, Glass, Impurities, Neodymium, Xenon lamps, Optics, Colors, Materials, Markers.

As a part of a continuing program of laser efficiency improvement studies, a preliminary investigation has been made of the feasibility of converting the energy from an essentially white light source into useful pumping wavelengths by means of fluorescence. Both fluorescent dye solutions and powdered phosphors have been considered, and a laser head of coaxial design has been constructed that will enable an experimental study to be made of the use of either, or a combination of both, in modifying the light from an electronic discharge tube. Geometrical design of the optical coupling between lamp and laser rod also comes under study in the search for the ultimate design for the maximum conversion of electrical energy input into coherent light output. (Author)

AD-439 497 Div. 25
OTS price $3.60

Ohio State Univ. Research Foundation, Columbus.
THE KINETICS OF DIFFUSION CONTROLLED WHISKER GROWTH,
by V. Ruth and J. P. Hirth. Mar 64, 32p. Rept. no. TR4
Contract Nonr49526, RF Proj. 1386
Unclassified report

Descriptors: (*Whiskers, Crystal growth), (*Crystal growth, Single crystals), Mathematical analysis, Equations, Dynamics, Surface properties, Diffusion, Nucleation.

The problem of surface diffusion controlled whisker is considered in a moving frame of reference. In addition, diffusive exchange with the substrate, a problem not treated heretofore, is considered. The results are compared with experiment and with prior treatments of whisker growth. The possibility of occurrence of some prior mechanisms of whisker growth cessation is excluded. The material parameters that may be determined from whisker growth experiments are considered. (Author)

AD-439 525 Div. 25
OTS price $1.10

Brown Univ., Div. of Applied Mathematics, Providence, R. I.
A NOTE ON THE ONSET OF CONVECTION IN A SELF-GRAVITATING SPHERE,
by P. P. Niiler and F. E. Bisshopp. Apr 64, 9p. Rept. no. TR53
Contract Nonr56207, Proj. NR062 179
Unclassified report

Descriptors: (*Liquids, Energy), Hydrodynamics, Motion, Gravity, Thermodynamics, Perturbation theory, Boundary value problems, Polynomials, Bessel functions.

AD-439 530 Div. 25
OTS price $5.10

Lockheed Missile and Space Co., Sunnyvale, Calif.
MULTI-CHANNEL COLLISIONS,
by B. A. Lippmann. Jan 64, 54p. Rept. no. 2 12 64 1
Contract Nonr336800
Unclassified report

Descriptors: (*Resonance scattering, Theory), Wave functions, Perturbation theory, S-matrix, Particles, Quantum mechanics, Statistical mechanics.

The formal theory of scattering processes is extended to include multiplechannel scattering (rearrangement collisions). First, the single-channel case is reviewed. The multiple-channel case then is developed, in close analogy with the simpler case. The multiple-channel generalizations of the operator identities and the relations among the matrix elements that replace the familar single-channel forms are derived. Time-reversibility, reciprocity, and unitarity are suitably defined for single-channel and multi-channel collisions ard are shown to have the

physics, Masers), Radioactive decay, Photons, Lasers, Magneto-optic effect, Ions, Chromium, Nuclear resonance, Perturbation theory, Lithium, Electron bombardment, Atomic energy levels, Magnetic fields, Isotopes, Molecular spectroscopy, Molecular beams, Microwave spectroscopy, Nuclear spin, Ruby, Rubidium, Radio astronomy.

Further studies have been made of the two-photon decay of the metastable helium ion. Precise values have been obtained for the hyperfine interaction constants in the (3d54p)7P2, 4 states of CR53. Polarization and excitation studies are continuing on the (1s2p)3P-(1s2s)3S transistion in Li II preliminary to the determination of the 3P fine structure. Improved detectors are being developed for the study of metastable autoionizing atomic states. Work is being resumed on the determination of the fine and hyperfine structure of the 3P term of Li I. Light sources and resonance cells are being developed for double-resonance spectroscopy in the radioactive isotopes of lean and copper. Precise measurements have been made of the hyperfine structure of the 3 sub 13-3 sub 03 rotational transistion in NH2D. A new program of molecular magnetic rotation spectroscopy has been undertaken for the analysis of the vibrational structure of selected molecules. Work has been resumed on the experiment designed to determine the interaction between free atoms and crystalline surfaces. (Author)

AD-439 716 Div. 25
OTS price $16.50

Physical Electronics Research Lab., Inst. of Tech., Univ. of Minnesota, Minneapolis.
RESEARCH IN PHYSICS OF ELECTRON EMISSION AND ELECTRON TUBE TECHNOLOGY.
Interim rept. no. 3, 16 Oct 63-15 Apr 64,
by D. E. Anderson, A. B. Laponsky and W. T. Peria. 15 Apr 64, 254p.
Contract AF33 657 10475, Proj. 4156, Task 415605
Unclassified report

Descriptors: (*Electrons, Emissivity), (*Electron tubes, Scientific research), Secondary emission, Scattering, Measurement, Single crystals, Electron beams, Tungsten, Sodium compounds, Fluorides, Cathodes.

AD-439 831 Div. 25
OTS price $9.10

Elcon Lab., Inc., Watertown, Mass.
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS.
Interim engineering rept. no. 1.
26 Aug 63, 110p. Rept. no. R8 63 4
Contract AF33 657 11671
Unclassified report

Descriptors: (*Electromagnetic waves, Plasma medium), (*Plasma medium, Electromagnetic waves), Plasma physics, Modulation, Microwaves, Electrons, Theory, Electron density, Amplitude modulation, Signals, Heat, Voltage, Propagation.

The crossed-beam, cross modulation microwave plasma diagnostic technique is examined on the basis of average electron theory. One microwave beam is used to heat a selected portion of a plasma. This beam is amplitude modulated and produces a modulation of the plasma conductivity. A second steady beam is directed through the plasma and as a result of the heating produced by the first beam is modulated. The resulting signal is dependent only on the properties of the plasma in the region of intersection of the two beams. Tables of propagation constant versus electron density and collision frequency were prepared and expressions for the differential propagation constant were derived. Several methods for making an unambigious determination of the electron density and collision frequency are outlined. Various detection schemes and bridge arrangements are examined. A heterodyne detector with a large dynamic range appears necessary for successful measurement of the cross modulation. (Author)

AD-439 838 Div. 25
OTS price $10.10

Electro-Optical Systems, Inc., Pasadena, Calif.
STUDY, DESIGN, AND FABRICATION OF SOLAR ENERGY CONCENTRATOR MODELS,
by L. M. Springer. Aug 63, 129p.
Contract AF33 616 8402, Proj. 3145, Task 314502
RTD TDR63 4051 Unclassified report

Descriptors: (*Solar furnaces, Panels (Structural)), (*Reflectors, Solar furnaces), Design, Monocoques, Parabolic bodies, Electroforming, Manufacturing methods, Optical equipment, Optical properties, Physical properties, Feasibility studies, Mirrors, Solar radiation, Solar panels.

Six nonreflective, all-metal monocoque segment electroformed petals of a 44 1/2-foot-diameter parabolic reflector were designed, fabricated, and tested. The interrelationships between weight, accuracy, and some structural characteristics were relatively inexpensively investigated. Fabrication techniques and process parameters were identified and evaluated for future use. Replication accuracy was related to concentrator system performance by means of a solar ray-tracing technique. Simple structural comparisons were made by means of bending and torsinal spring rate determinations. Petal fabrication and test gear, including all of the required patterns and attendent electroforming equipment were designed and fabricated. Recommendations for certain features of more sophisticated future programs involving large lightweight electroformed structures were derived. (Author)

AD-439 839 Div. 25
OTS price $1.10

Elcon Lab., Inc., Watertown, Mass.
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS.
Monthly rept. no. 2.
14 Aug 63, 4p. Rept. no. R8 63 2
Contract AF33 657 11671
Unclassified report

Descriptors: (*Electromagnetic waves, Plasma medium), (*Plasma medium, Electromagnetic waves), Design, Electron, Theory, Signals, Modulation, Noise (Radio), Bandwidth, Detection, Detectors, Narrow band, Microwaves, Electron density.

AD-439 846 Div. 25
OTS price $1.10

Elcon Lab., Inc., Watertown, Mass.
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS.
Monthly rept. no. 1.
12 July 63, 4p. Rept. no. R7 63 4
Contract AF33 657 11671
Unclassified report

Descriptors: (*Electromagnetic waves, Plasma medium), Argon, X band, K band, Detectors.

are as general as the ones obtained by Lianis who made use of Coleman and Noll's functional formulation. It is also shown that more restricted relations may be obtained by reducing the generality of the form of the polynomials. In particular, a class of materials is postulated, the viscoelastic nature of which can be described by two relaxation functions as opposed to twelve relaxation functions which are necessary for the more genera solids. It is also shown that an even more restricted class of materials can exist where one relaxation function suffices to define the viscoelastic behavior of the solid. (Author)

AD-439 676 Div. 25
OTS price $3.60

Lockheed Propulsion Co., Redlands, Calif.
PROBLEMS OF SMALL STRAINS SUPERPOSED ON FINITE DEFORMATION IN VISCOELASTIC SOLIDS,
by George Lianis. Jun 63, 33p.
Contract AF04 611 8539, Proj. 3480
Unclassified report

Subcontract to Purdue Univ., Lafayette, Ind., School of Aeronautical and Engineering Sciences.

Descriptors: (*Deformation, Stresses), Strain (Mechanics), Viscoelasticity, Relaxation time, Tensor analysis, Hydrostatic pressure.

Certain problems of stress relaxation, due to small strains applied to a deformed viscoelastic material are examined. The initial strain is assumed nonlinear, and the material completely relaxed. The solutions obtained are useful in the design of experimental techniques for measurements of viscoelastic properties under finite deformation. (Author)

AD-439 683 Div. 25, 8
OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS.
Quarterly progress rept. no. 3, 8 Oct 63-8 Jan 64,
by J. W. Johnson. 7 Feb 64, 10p.
Contract NObs88487, SRI Proj. PAU 4444; SR007 12 01
Unclassified report

Descriptors: (*Thermoelectricity, Semiconductors), (*Resistance (Electrical), High-temperature research), (*Semiconductors, Thermoelectricity), Sulfides, Copper compounds, Lead compounds, Phosphides, Mixtures.

Measurements of the Seebeck coefficient and resistivity of the cuprous sulfide-lead sulfide system in the liquid state have been made for compositions containing 75, 50, and 25 mole percent cuprous sulfide. The 75 mole percent cuprous sulfide composition is a p-type semiconductor having a Seebeck coefficient of + 325 microvolts/degree C and a resistivity of 0.021 ohm cm at the same temperature. The 50 and 25 mole percent cuprous sulfide compositions are both n-type; the 25 mole percent composition has a Seebeck coefficient of -185 microvolts/degree C and a resistivity of 0.026 ohm cm at 800 C. The 50 mole percent composition has a resistivity that is higher by a factor of 2 over the 25 and 75 compositions, and a Seebeck coefficient which is intermediate between them. Data on the Seebeck coefficient and resistivity of the 50 mole percent cuprous sulfide-cuprous phosphide system are presented in the temperature range of 1000 to 1200 C. (Author)

AD-439 685 Div. 25
OTS price $5.60

Lockheed Propulsion Co., Redlands, Calif.
CONSTITUTIVE EQUATIONS OF VISCOELASTIC SOLIDS UNDER FINITE DEFORMATION,
by George Lianis. Dec 63, 57p.
Contract AF94 611 8539, Proj. 3480
Unclassified report

Subcontract to Purdue Univ., Lafayette, Ind. School of Aeronautical and Engineering Sciences, Rept.

Descriptors: (*Solids, Deformation), (*Nonlinear systems, Equations), (*Viscoelasticity, Equations), (*Stresses, Solids), (*Deformation, Mathematical analysis), Transformations (Mathematics), Boundary value problems, Strain (Mechanics), Elasticity, Integral transforms, Vector analysis, Motion, Field theory.

The constitutive equations of reference 1 are discussed. Subsequently to establish a similarity between the short-time elastic response and the long-time equalibrium stress for materials with fading memory, certain approximations are proposed. A number of boundary-value problems under prescribed static finite strain and small dynamic strains superposed on prestressed solids are solved. Existing experimental data compared with these solutions appear to favor the proposed approximations. (Author)

AD-439 686 Div. 25
OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE RESEARCH.
16 Aug 63, 67p. Rept. no. 2
Contract AF19 628 500
Unclassified report

Descriptors: (*Solid state physics, Scientific research), (*Masers, Scientific research), (*Molecular spectroscopy, Solid state physics), Semiconductors, Diodes (Semiconductor), Single crystals, Crystal growth, Superconductors, Cryogenics, Transition elements, Rare earth compounds, Fluorescence, Spectra (Infrared), Pumping (Electronics), Lasers, Magnetic materials, Paramagnetic materials, Helium, Isotopes, Phonons.

Contents: Solid State Device Design -- Magnetically Tunable CW InAs Diode Maser, Semiconductor Diode Masers of Indium Gallium Arsenide, Diffused p-n Junction Diodes of PbSe, Open-Tube Epitaxy, Laser Pump; Materials Research -- Crystal Growth, Properties of n-Type PbSe, Superconducting Nb Thin Films, High-Pressure Research, Chemical Analysis; Band Structure and Spectroscopy of Solids; Spectroscopy of Magnetic Solids; Transition-Metal and Rare-Earth Compounds; Optics and Infrared. (Author)

AD-439 695 Div. 25
OTS price $6.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 5, 16 Dec 63-15 Mar 64,
by R. Novick. 15 Mar 64, 66p. Rept. no. CU 3 64
Contracts DA36 039SC90789 and AF49 638 557, Proj. NR372 101, DA Task 3A99 20 001 09
Unclassified report

Descriptors: (*Helium, Hyperfine structure), (*Masers, Hyperfine structure), (*Solid state

ENERGY TO THE ROLLING PROCESS FOR SHEET METALS.
Bimonthly progress rept. no. 1, 6 Feb-6 Apr 64, by James W. Cunningham. 6 Apr 64, 13p.
Contract NOw640294J

Unclassified report

Descriptors: (*Material forming, Rolling (Metallurgy)), (*Rolling (Metallurgy), Ultrasonic radiation), Sheets, Feasibility studies, Vibration, Friction, Loading (Mechanics), Mechanical properties, Stresses, Rolling mills, Tranducers, Aluminum, Deformation.

Two effects are anticipated from the use of ultrasonics in rolling: a possible reduction of yield strength and reduced friction in the roll gap. The relative magnitude of these effects and their relation to rolling variables will determine the experimental program. Design problems in the construction of a transducerized roll have been analyzed and an experiment to solve them initiated. (Author)

AD-439 329 Div. 26, 1
OTS price $8.10

Northrop Corp., Hawthorne, Calif.
LAMINAR FLOW CONTROL DEMONSTRATION PROGRAM. LFC MANUFACTURING TECHNIQUES.
Final rept.
Mar 64, 89p. Rept. no. 61 142
Contract AF33 600 42052

Unclassified report

Descriptors: (*Jet bombers, Boundary layer control systems), (*Boundary layer control systems, Wing slots), (*Wings, Manufacturing methods), Suction slots, Construction, Design, Boundary layer control, Jet bombers, Drilling machines, Machine tools, Bonding, Adhesives, Aileron, Quality control, Jigs, Laminar boundary layer, Jet planes, Area suction, Research planes.

AD-439 408 Div. 26
OTS price $5.60

National Semiconductor Corp., Danbury, Conn.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N328A TRANSISTOR.
Quarterly progress rept. no. 2, 30 Sep-31 Dec 63, by R. R. Rau. 31 Dec 63, 55p.
Contract DA36 039AMC01480E

Unclassified report

Descriptors: (*Transistors, Production), (*Production, Manufacturing methods), (*Manufacturing methods, Transistors), Furnaces, Welding, Measuring devices (Electrical & electronic), Stresses, Aluminum, Vapor plating, Gas analysis, Reliability (Electronics), Failure (Mechanics).

The PERT scheduling of the contract has been updated. All work is on schedule with appropriate account taken of the slack paths available. The etch wheel is 80% complete. Additional furnaces have been procured for the installation on one-half of proposed new line after the installation of the etch wheel. The recirculator has been fully installed, evaluated, and made an operational part of the present alloy line. The recirculator produced a very significant increase in test box yield and an improved performance on step-stress testing. The oxygen analyzer has been installed but not fully evaluated. The cap welding shield has been incorporated as part of the manufacturing line; preliminary evaluation by the Electromechanical stress tester of an improved form of C bend weld shield give indications of improvements to be expected here. Some success has been achieved in fabricating units by the aluminum evaporation technique, and preliminary evaluation of some of these units has been made. (Author)

AD-439 446 Div. 26
OTS price $2.60

Lockheed Missiles and Space Co., Sunnyvale, Calif.
THERMIT WELDING: A SELECTIVE BIBLIOGRAPHY, by Scott J. Buginas. Feb 63, 21p. Rept. no. SB63 25; 5 73 63 7

Unclassified report

Descriptors: (*Thermite, Welding), (*Welding, Thermite), Aluminum alloys, Bibliographies, Indexes, Welds.

This bibliography contains 59 selected references on thermit welding from the literature of 1940-1962. The prime interest areas of the search were in joining aluminum by this process and in joining heavy plate. Brief abstracts are included with most citations to expand title information. Abstracts are arranged in alphabetical order by author's name. (Author)

AD-439 498 Div. 26, 17
OTS price $1.60

Brush Beryllium Co., Cleveland, Ohio.
DEVELOPMENT OF VERY HIGH STRENGTH BERYLLIUM WIRE.
Bimonthly rept. no. 2, 6 Feb-6 Apr 64, by E. A. Murphy and R. G. O'Rourke. 6 Apr 64, 13p. Rept. no. TR351 243
Contract NOw64 0162c

Unclassified report

Descriptors: (*Beryllium, Wire), (*Wire, Material forming), Drawing (Machine processing), Extrusion, Filaments, Manufacturing methods, Powder metals, Heat treatment.

Work directed toward development of a process to produce high-strength beryllium fine wire is described. The extrusion data for -10 + 1 (IP) and 0.4% Fe alloy are listed along with the known chemistry of the -10 + 1 (IP) material. Warm drawing results of the -74 + 1, -20 +1, -10 + 1, and -5 + 1 materials are discussed. Future plans include continued conversion of the extruded stock and evaluation of the drawn wire. (Author)

AD-439 606 Div. 26, 14
OTS price $5.60

SKF Industries, Inc., Philadelphia, Pa.
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
Progress rept. no. 9, 22 Sep-22 Dec 63, by E. F. Brady, J. A. Martin, K. J. Riedy, W. Schmidt and A. J. Schwartz. 22 Dec 63, 52p.
Rept. no. AL64T014
Contract NOw6107l6C, Proj. XV3 6

Unclassified report

Descriptors: (*Lubrication, Roller bearings), (*Roller bearings, Lubrication), (*Ball bearings, Lubrication), Tracer studies, Electrical conductance, Ethers, Aromatic compounds, Polycyclic compounds, Lubricants, Wear resistance, Particle size, Autoradiography, Test equipment, X rays, Films, Mineral oils, Friction, Thickness, Velocity, Lubricant additives, Phenols, Test methods, Experimental data, Polymers.

26. PRODUCTION AND MANAGEMENT

AD-438 009 Div. 26, 17, 12
OTS price $5.60

Lycoming Div., AVCO Corp., Stratford, Conn.
METASTABLE AUSTENITIC FORMING OF HIGH STRENGTH PRESSURE VESSELS.
Semiannual rept. no. 3, 1 Apr-Sep 63,
J. M. Raymer. 15 Oct 63, 54p.
Contract AF33 657 7955
Unclassified report

Descriptors: (*Pressure vessels, Material forming), (*Material forming, Metal spinning), Maraging steel, Stainless steel, Tool steel, Processing, Metallography, Heat treatment, Deformation, Hydrostatic pressure, Statistical analysis, Mechanical properties, Cylindrical bodies, Rocket cases, Austenite, Martensite, Microstructure, Aging (Materials), Temperature, Time.

Detailed analysis of the effects of the various processing parameters employed during Phase I effort was completed. Most information was obtained from the full factorial experiment of the 18NiCoMo (300) maraging steel, where parametric and non-parametric analyses were carried out. From these analyses, an optimum combination of processing parameters was derived, and incorporated in the processing schedule of the intermediate size cylindrical test specimen. All necessary forgings in 18 NiCoMo (300) maraging steel and tooling for fabrication were obtained and two 14.5 in. diameter cylindrical test bottles were spun to verify the results obtained during Phase I. Effort was made in evaluating the backup approach to effect closure of the aft end by a shrinking operation. (Author)

AD-438 013 Div. 26
OTS price $2.60

Forest Products Lab., Madison, Wis.
SOME ASPECTS OF SAWING ACCURACY IN CIRCULAR MILLS,
by Hiram Hallock. Mar 64, 23p. Rept. no. FPL029
Unclassified report

Descriptors: (*Studs, Wood), (*Physical properties, Studs), (*Saws, Wood), Industrial production, Statistical analysis, Configuration.

A study to examine the capabilities of a well-maintained circular sawmill in sizing 2- by 4-in. studs sawn from small loblolly pine logs was conducted at the U.S. Forest Products Laboratory. The additional aspect of the effect of compression wood both in the log and in the stud on sawing variation was also studied. (Author)

AD-438 258 Div. 26
OTS price $7.60

Purdue Univ., Lafayette, Ind.
SELECTION OF A DELAY LINE MODEL,
by Rufus Oldenburger and Lawrence L. Hoberock.
Apr 64, 71p. TR2
Contract Nonr1100 20
Unclassified report

Descriptors: (*Delay lines, Mathematical models), (*Adaptive control systems, Delay lines), Linear systems, Integral transforms, Feedback, Hydraulic systems, Mathematical analysis, Time.

A mathematical model of a linear system can be derived using an approximation of the convolution integral. A model is selected such that responses to commonly occurring inputs are closest to corresponding responses of the system. The transfer function of the model is the product of the system transfer function by a linear combination of two delay terms divided by an infinite product. If the model delay time is small the infinite product may be replaced by 1, and thus may be dropped. The delay time and the number of delay elements are selected such that the responses of the simplified model are closest to corresponding responses of the system. The validity of the simplification is investigated for various inputs by comparing the responses of the simplified model with those of the exact model. It is found for several types of commonly occurring inputs that the number of delay elements should be chosen as large as physically possible. The results show that the value of the delay time should be selected as a function of the number of delay elements and of the system bandwidth. It is further shown that this function is the same for each of the inputs. (Author)

AD-438 432 Div. 26, 17, 25
OTS price $2.75

Defense Metals Information Center, Columbus, Ohio.
CRACKING IN HIGH-STRENGTH STEEL WELDMENTS -- A CRITICAL REVIEW,
by P. A. Kammer, K. Masubuchi, and R. E. Monroe.
7 Feb 64, 122p. Rept. no. 197
Contract AF33 615 1121, Proj. 8975
Unclassified report

Descriptors: (*Steel, Welds), (*Welds, Fracture (Mechanics)), Reviews, Brittleness, Theory, Test methods, Hydrogen embrittlement, Propagation, Stresses, Temperature, Detection, Mechanical properties, Ductility, Toughness, Strain (Mechanics), Rupture, Heat treatment, Energy, Microstructure, Crystal lattices defects, Bibliographies.

Weldment cracking is a broad complex field. Even if one considers only cracking of steel weldments, the problems range from cracking at temperatures near the solidus during welding to cracking at room temperature days, weeks, or months after welding is completed. Numerous reports of investigations in this field are contained in the published and unpublished literature. However, most of these reports cover only a particular problem in a specific area of the broad field of weldment cracking. This review attempts to cover the major aspects of the entire field of weldment cracking. Necessarily, the review is for the most part general, only being specific in a few instances to illustrate a point. (Author)

AD-438 786 Div. 26
OTS price $4.60

San Antonio Air Materiel Area, Kelly Air Force Base, Tex.
PROCESS LINE ANALYSIS BY NETWORKS. A TECHNIQUE FOR BALANCING AND CONTROLLING THE PROGRESS OF A MANAGEMENT OR INDUSTRIAL PROCESS,
by Jerry L. Marchbanks. 1 Aug 63, 42p.
Unclassified report

Descriptors: (*Management engineering, Production control), (*Industrial production, Management control systems), Operations research, Management planning. Time studies, Analysis.

AD-438 937 Div. 26
OTS price $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
STUDY OF THE FEASIBILITY OF APPLYING ULTRASONIC

27. PROPULSION SYSTEMS

AD-437 909 Div. 27, 9
OTS price $1.25

Air Force Flight Dynamics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
DESIGN ANALYSIS SUMMARY OF TWO FORCE-BALANCE HYPERSONIC INLET CONFIGURATIONS,
by Paul H. Kutschenreuter, Jr., Richard L. Balent and George K. Richy. Mar 64, 47p.
Proj. 1366, Task 136605
FDL TDR64 19 Unclassified report

Report on Hypersonic Induction System Research.

Descriptors: (*Ramjet inlets, Hypersonic diffusers), Hypersonic characteristics, Air-breathing engines (Unconventional), Performance (Engineering), Aerodynamic configuration, Design, Drag, Laminar boundary layer, Gas flow, Shock waves, Surface properties, Friction, Pressure, Wind tunnel models, Hypersonic flow, Aerodynamic loading.

Two hypersonic inlet models were designed for force balance testing in the Cornell Aeronautical Laboratory 48-inch shock tunnel over a Mach Number range of 8 to 16. The performance of these models is to be established experimentally on the basis of their measured internal drag. Reasons for considering this method of establishing hypersonic inlet performance and use of the associated drag equivalent pressure recovery are discussed. The design of these models, the resulting inlet geometry, and the related performance caluclations are described. (Author)

AD-438 195 Div. 27, 12
OTS price $4.60

Goodyear Aerospace Corp., Akron, Ohio.
STUDY OF THE EFFECTS OF MECHANICAL DAMAGE ON THE PERFORMANCE OF FILAMENT-WOUND MOTOR CASES.
Progress rept. no. 6, 1 Feb-31 Mar 64,
by R. A. Burkley, T. J. Boller and I. R. Butcher.
20 Apr 64, 45p. Rept. no. GER 11154, suppl. 5
Contract NOw63 0449c FBM
Unclassified report

Descriptors: (*Rocket cases, Filament wound construction), Damage, Failure (Mechanics) Stresses, Maintenance, Reliability, Quality control, Booster motors, Cutting tools, Hydro static pressure, Winding, Guided missiles (Underwater-to-surface), Mechanical properties.

This report discusses the fabrication, machine flawing, and testing of 18-inch diameter filament-wound bottles. The objectives of the study program under this contract are to study the effects of surface flaws on the performance of Polaris motor cases, to compare the effect of winding sequence on the ability to resist failure from surface flaws, and to determine the reliability of various repair techniques. (Author)

AD-438 225 Div. 27, 26, 17
OTS price $18.50

North American Aviation, Inc., Los Angeles, Calif.
APPLIED RESEARCH AND DEVELOPMENT WORK ON FAMILIES OF BRAZED AND WELDED FITTINGS FOR ROCKET PROPULSION FLUID SYSTEMS,
Final rept.,
by M. H. Weisman, P. A. Beeson, G. Martin, W. D. Padian and C. J. Muser. Feb 64, 300p.
Contract AF04 611 8177, Proj. 6753, Task 675304
RPL TDR64 24 Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Fittings), (*Fittings, Brazing), (*Brazing, Pipes), (*Welding, Pipes), Fuel systems, Stainless steel, High-pressure research, Liquid rocket propellants, Pneumatic systems, Corrosion inhibition, Corrosion-resistant alloys, Hydrazine, Hydrazine derivatives, Nitric acid, Nitrogen compounds, Tetroxides, Fluorine compound, Aluminum alloys, Shear stresses, Thickness, Arc welding, Silver solders, Welding rods, Couplings, Temperature, Test methods, Thermal stresses, Tests, Stresses, Buckling (Mechanics), Deflection, Elasticity.

Recommendations are made for materials for rocket propulsion fluid system tubing and fittings based on literature survey of compatibility of materials with system fluids and effects of joining processes on the materials. Describes joining procedures, joint designs, prototype joining tooling, and successful qualification test program for induction brazed and for machine TIG welded joints in AISI 347 and AM350 stainless steel and Rene '41 tubing for machine TIG welded joints in 6061 aluminum tubing. Drawings, descriptions, and tese requirements for fittings and joining tooling are included in the form of proposed specifications. (Author)

AD-438 713 Div. 27, 17, 26
OTS price $14.00

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME II. RING ROLLING AND FLOW-TURNING CYLINDRICAL SECTIONS.
Final rept.
31 Oct 63, 202p. Rept. no. 2267, vol. 2
Contract DA19 0200RD5230, Proj. 5B93 32 004
WAL 776 2 1 14 Unclassified report

Descriptors: (*Rocket cases, Titanium alloys), (*Titanium alloys, Metal spinning), Material forming, Aluminum alloys, Chromium alloys, Vanadium alloys, Cylindrical bodies, Heat treatment, Crystal structure, Tensile properties, Fracture (Mechanics), Aging (Materials), Tables.

A major improvement in flow-turning techaique was developed with subscale parts. The effects of roller geometry, mandrel speed, wall thickness reduction per pass, and roller-feed rate on radial growth and local bulging were determined. It was found that roller geometry had the most predominant effect on dimensional control and a new roller design with parabolic contours was developed which gave positive control of diametral growth. A correlation of flow-turning parameters was developed which permitted techniques developed with subscale cylinders to be directly applied to full scale parts. The resulting full scale flow-turned cylinders had very little diametral growth and no local bulging. (Author)

AD-438 714 Div. 27, 17, 26
OTS price $18.00

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME IV. FABRICATION AND TESTING OF FULL SCALE COMPONENTS.
Final rept.
by Loren Godfrey and R. Makawski. 31 Oct 63, 290p. Rept. no. 2267, vol. 4
Contract DA19 0200RD5230, Projs. 5B93 32 004, TB4 004
WAL 766 2 1 14 Unclassified report

Studies using radiotracer techniques and electrical conductivity measurements developed previously were continued, using a rolling four-ball test machine. Data on several lubricants under different operating conditions are reported. The development of high resolution autoradiography techniques is described and the results of a brief study of wear particle size in the rolling four-ball tester are given as well as recent progress in the development of a dynamic two-ball tester for the study of film thickness and lubrication effects on contact stresses at rolling contacts, using X-ray beam techniques. A Primol-decalin lubricant blend having 8.9 cs. viscosity at test temperature was selected for endurance testing. Wear tests were conducted on the synthetic lubricant polyphenyl ether. Conductivity tests were run on polyphenyl ether and also on an ester base lubricant (Mil-L-7808D). (Author)

AD-439 655 Div. 26, 14
OTS price $4.60

Narmco Industries, Inc., San Diego, Calif.
OPTIMUM FILAMENT DIAMETER.
Quarterly rept. no. 7, 20 Jan-20 Apr 64,
by J. Jobaris. 16 Apr 64, 50p.
Contract NObs86347, Proj. R007 0304, Task 1008
Unclassified report

Descriptors: (*Stiffened cylinders, Manufacturing methods), (*Filament, Optimization), (*Cylindrical bodies, Compressive properties), (*Glass textiles, Stiffened cylinders), Hydrostatic pressure, Stresses, Rings, Deformation, Shear stresses, Deflection, Strain (Mechanics), Buckling (Mechanics), Epoxy plastics, Laminated plastics, Filament wound construction, Structural shells, Failure (Mechanics), Reinforcing materials, Mathematical analysis, Composite materials, Extensometers.

Seven cylinders, three unstiffened and four ring-stiffened, were fabricated and tested in biaxial hydrostatic compression. All cylinders were made from 5-mil diameter E-glass fibers and ERL 2256 epoxy resin. Pertinent data and test results are reported. (Author)

AD-439 657 Div. 26
OTS price $4.60

Hexcel Products Co., Berkeley, Calif.
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE.
Progress rept. no. 3 for Mar 64,
by M. N. Bandak. 7 Apr 64, 42p.
Contract DA04 200AMC477A
Unclassified report

Descriptors: (*Honeycomb cores, Design), Specifications, Fabrication, Fragmentation, Test methods, Salt spray tests, Temperature, Humidity, Vibration, Leakage, Theory, Hydrostatics.

During the current reporting period, work was done in the following areas; test equipment calibration, fabrication of tooling and test equipment, preliminary engineering drawing release, fabrication and testing of typical construction specimens, fabrication of the prototype Case HXL-1-477, and hydrostatic and drop testing of the prototype Case. Tests were conducted on small specimens of typical construction using 1.2 lb/cu ft density core to simulate energy absorption cylinder and end caps. The test results showed agreement with the theoretical deceleration calculations. Hydrostatic and drop tests were conducted on the prototype Case HXL-1-477. The hydrostatic test resulted in leakage in the energy absorption core. The drop tests resulted in high peak levels caused primarily by rigidity of the edge potting and the skins. (Author)

AD-439 856 Div. 26
OTS price $2.60

Boeing Co., Seattle, Wash.
INVESTIGATION OF SELF-ALIGNING BEARING MOUNTINGS FOR SPACE OPERATION.
Quarterly progress rept. no. 2, 1 June-1 Sep 63,
Sep 63, 24p.
Contract AF33 657 10422, Proj. 1315, Task 131501
Unclassified report

Descriptors: (*Mounting brackets, Ball bearings), (*Ball bearings, Mounting brackets), (*Antifriction bearings, Mounting brackets), Space environmental conditions, Design, Lubrication, Rings, Aluminum compounds, Oxides, Manufacturing methods, Test equipment, Vacuum apparatus, Alignment.

This report describes the first three months effort in the 'Investigation of Self-Aligning Bearing Mountings for Space Operation'. Fabrication was initiated on two mounting concepts studied previously. Lubricants were selected for use in -100 to 2500 F temperature and 10 to the -9th power Torr vacuum environments. Fabrication of in-air test equipment was completed and vacuum test equipment fabrication is nearing completion. (Author)

AD-439 857 Div. 26, 14, 12
OTS price $2.60

Boeing Co., Seattle, Wash.
INVESTIGATION OF SELF-ALIGNING BEARING MOUNTINGS FOR SPACE OPERATION.
Quarterly progress rept. no. 3, 1 Sep-1 Dec 63.
Dec 63, 28p.
Contract AF33 657 10422, Proj. 1315, Task 131501
Unclassified report

Descriptors: (*Bearings, Mounting brackets), (*Airframe bearings, Design), Airframes, Deflection, Thermal expansion, Space environmental conditions, Ceramic materials, Porous materials, Lubricants, Impregnation, Ball bearings, Journal bearings, Antifriction bearings, Tungsten compounds, Sulfides, Sodium compounds, Silicates, Aluminum compounds, Oxides, Niobium alloys, Refractory coatings, Silicides, Test equipment, Vacuum apparatus, Failure (Mechanics), Molybdenum compounds, Metal coatings, Palladium, Iridium, Films, Aerospace craft, Alignment.

The major components of the self-aligning mountings selected in Phase 1 and the mounting test fixtures were fabricated. Two in-air tests of one mounting concept were completed. One specimen failed after completing 487 cycles at -100 F. The second specimen successfully completed 750 cycles at -100 F but failed after 374 cycles at 1500 F. Concurrent in-air and ultra-high vacuum testing is scheduled. (Author)

The Breakerless High-Frequency Ignition System was developed by the Wright Aeronautical Division and the Scintilla Division of the Bendix Corporation for the R-1820-82/-82A model engines installed in S-2 type airplanes. This report covers Phase I of the evaluation. The system operated satisfactorily throughout the flight regime of the airplane. No special magneto cooling was required. The system is compatible with high-powered shipboard radar. Phase II of the evaluation will provide further flight testing and permit the determination of service life expectancy. (Author)

AD-439 421 Div. 27, 26, 17
OTS price $3.60

Rocketdyne, Canoga Park, Calif.
SELF-COOLED ROCKET NOZZLES.
Quarterly progress rept. 1 Nov 63-31 Jan 64,
by P. Schwarzkopf and J. D. Seader. 27 Feb 64, 32p. Rept. no. R 3853 5
Contract AF33 657 9166, Proj. 03 6899 7351, Task 735 101
Unclassified report

Descriptors: (*Rocket motor nozzles, Cooling), Composite materials, Thermal conductivity, Equations, Tungsten, Zinc, Surface temperatures, Time, Porous metals, Scheduling, Programming (Computers), Manufacturing methods.

The work performed during the second quarter of the second year of a program to advance the self-cooled rocket nozzle concept is reported. Modifications to the computer-programmed theoretical analysis of self-cooling are described. A major addition to the analysis is the calculation of cases for composites of the heterogeneous matrix porosity which indicate the manner by which the self-cooling concept may be optimized. Fabrication procedures for the production of composites of complex matrix microstructure are described. The current status and future of the program are discussed. (Author)

AD-439 447 Div. 27
OTS price $1.10

British Internal Combustion Engine Research Association, Ltd., Slough (England).
COMBUSTION IN DIESEL ENGINES.
Quarterly technical status rept. no. 2, 1 Nov 63-31 Jan 64,
by D. W. Tryhorn. 20 Feb 64, 3p.
Contract DA91 591EUC2974
Unclassified report

Descriptors: (*Diesel engines, Combustion), Tests, Operation, Temperature, Low pressure research, Compressive properties, Great Britain.

AD-439 681 Div. 27
OTS price $8.60

Stanford Univ., Calif.
A STRATIFIED CHARGE TWO-STROKE SPARK IGNITION ENGINE (RAM STRATICHARGE, VEE-4, 108.6 IN3 DISP.) PERFORMANCE CHARACTERISTICS,
by H. E. Fandrich. 1 Feb 64, 98p. TR S1
Contract Nonr225 23, Proj. NR 090 342
Unclassified report

Descriptors: (*Internal combustion engines, Design), Fuel consumption, Exhaust gases, Hydrocarbons, Reduction, Passenger vehicles, Air, Performance (Engineering), Spark ignition, Gasoline, Mixtures, Fuel injection, Combustion.

The RAM vee-4, two-stroke stratified charge engine is a spark-ignition, blown, pressure lubricated, port valve engine with a cam-actuated auxiliary air inlet poppet valve. It is designed to operate with lean air-fuel ratios, like a compression-ignition engine, but with a low compression ratio and spark ignition. The engine with the 90 degree duration cam for the poppet valve has a flat specific fuel consumption curve at approximately .60 lb/shp-hr and hydrocarbon emissions of 2 to 3%. The maximum brake mean effective pressure at 2000 rpm was 90 psi. The longer duration cam (120 degrees) results in a somewhat higher specific fuel consumption averaging approximately .63 lb/shp-hr over a smaller range of speeds and torques. Hydrocarbon emissions are higher of the order of 4 to 5%. These hydrocarbons were emitted at minimum specific fuel consumption and can be reduced further by air-fuel ratio control. The maximum brake mean effective pressure for the 120 degree cam was approximately 80 psi. The specific fuel consumption is independent of air-fuel ratios over a considerable range but the range decreases as the load is reduced. The hydrocarbon emissions depend primarily on overall air-fuel ratio. (Author)

AD-439 834 Div. 27
OTS price $6.60

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
HANDLING AND OPERATING INSTRUCTIONS FOR ROCKET MOTOR X258,
by P. Johnson. May 63, 62p. Rept. no. M126
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Handling), Fourth-stage motors, Launch vehicles (Aerospace), Sounding rockets, Storage, Filament wound construction, Rocket igniters, Installation, Explosives initiators, Rocket motor nozzles, Containers, Instruction manuals, Photographs, Operation.

Rocket motor X258 is a case-bonded, composite-modified double-base solid propellant system which uses reinforced plastic and aluminum for all major inert components. The unit packages 506 pounds of propellant in 70 pounds of inert weight. Weight at burnout is approximately 63 pounds. The X258 delivers 143,200 lbs-sec of total impulse when operating in vacuum. Rocket Motor X258 was developed as the fourth stage power plant for the Scout launching vehicle. This manual gives a brief description of rocket motor X258 and the operating, handling, and storage instructions necessary for its proper use. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-437 917 Div. 28
OTS price $2.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
SHORT-TERM MEMORY: NON-EQUIVALENCE OF QUERY AND MESSAGE ITEMS,
by James D. Baker and Walter E. Organist. Feb 64, 24p.
Proj. 4690, Task 469003
ESD TDR64 254 Unclassified report

Descriptors: (*Memory, Recall), (*Human engineering, Perception), Stimulation, Test

Descriptors: (*Rocket cases, Titanium alloys), (*Manufacturing methods, Rocket cases), Machining, Welding, Fracture (Mechanics), Toughness, Stresses, Mathematical analysis, Tensile properties, Strain (Mechanics), Hydrostatic pressure, Tables, Microstructure, Welds, Fractography, Aluminum alloys, Chromium alloys, Vanadium alloys.

Machining techniques were developed to achieve most rapid stock removal and the best surface finish on B-120 VCA titanium alloy full scale component forgings in the fully aged condition. Full scale components were TIG welded to a simple forged and machined burst-test adapter to prove the component design prior to fabricating a full scale second stage case. A full scale rocket motor case of the Pershing second stage design was fabricated by TIG welding end closure skirt extensions, weighed 120 pounds which is approximately 30 percent lighter than similar steel cases. The case was instrumented and sucessfully hydrostatically burst tested. (Author)

AD-438 715 Div. 27, 17, 26
OTS price $18.00

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME III. DEVELOPMENT OF WELDING PRACTICE.
Final rept.,
by Loren Godfrey and R. Makowski. 31 Oct 63, 289p. Rept. no. 2267, vol. 3
Contract DA19 0200RD5230, Projs. 5B93 32 004, TB4 004
WAL 776 2 1 14 Unclassified report

Descriptors: (*Rocket cases, Titanium alloys), (*Titanium alloys, Welding), Aluminum alloys, Chrominum alloys, Vanadium alloys, Welds, Toughness, Fracture (Mechanics), Stresses, Porosity, Arc welding, Electron beam, Fractography, Tensile properties, Steel, Crystal structure, microstructure.

Various welding practices were evaluated by bend, smooth and notched (Ksub t=8) tensile, and tensile Gsub c testing. In addition, a cyclic test technique was developed which simulated the stresses welds would be subjected to during hydrostatic pressure testing. This technique was used to investigate the tendency for the welds to crack through porosity. The various welding practices included electron beam welding and single and multipass TIG welding using various filler materials and welding fixturing. Electron beam welding did not produce a significant improvement in weld toughness and had many disadvantages for the intended application. (Author)

AD-438 716 Div. 27, 17, 26
OTS price $7.60

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME V. - EVALUATION OF CANDIDATE TITANIUM ALLOYS.
Final rept.,
by Loren Gelfrey and R. Makawski. 31 Oct 63, 74p. Rept. no. 2267, vol. 5
Contract DA19 0200RD5230, Projs. 5B93 32 004, TB4 004,
WAL 766 2 1 14 Unclassified report

Descriptors: (*Rocket cases, Titanium alloys), (*Titanium alloys, Mechanical properties), Welding, Welds, Heat treatment, Aging (Materials), Cold working, Rolling (Metallurgy), Tensile properties, Hardness, Microstructure, Ductility, Toughness, Fracture (Mechanics), Tables, Aluminum alloys, Molybdenum alloys, Tin alloys, Vanadium alloys.

Roll forged rings of Ti-6Al-6V-2Sn alloy were evaluated for weldability by the TIG process and the resulting weldments were tested for mechanical properties. The effects of post-weld heat treatments in the aging and annealing ranges on both parent and weld metal were evaluated. Two sheets of Ti-15 Mo alloy were evaluated for mechanical properties in the solution treated and in the solution treated and aged conditions. The effects of aging temperature on aging response and the effect of tensile testing temperature (-40 to 400F) on material properties after aging at 975F were investigated. Aging response after cold rolling (35 to 75 percent reductions) was also determined. Solution treated and aged sheet stock was manually TIG welded using parent metal filler material and evaluated by bend, tensile, and cyclic testing. (Author)

AD-439 205 Div. 27, 6
OTS price $9.10

Bolt, Berank and Newman, Inc., Cambridge, Mass.
PISTON-SLAP NOISE IN RECIPROCATING MACHINERY, by Eric E. Ungar, Donald Ross and Franklin F. Alvarez. Jan 64, rev. 15 Apr 64, 105p. Rept. no. 1106
Contract NObs88480, Proj. 11125; SF013 11 01, Task 1355
Unclassified report

Descriptors: (*Internal combustion engine noise, Pistons), (*Pistons, Internal combustion engine noise), Motion, Vibration, Diesel engines, Marine engines, Ship noise, Audiofrequency, Theory, Mathematical analysis, Compressor noise, Noise.

The most important component of mechanical noise of reciprocating machinery appears to be that due to piston-slap, i.e., due to the impacts associated with lateral piston motions across cylinder clearance spaces. This noise mechanism can account for several observed characteristics of diesel engine noise not readily explained by the more popular theories which consider essentially only effects of cylinder gas pressure changes. The original calculations of piston impacts by V. I. Zinchenko did not consider connecting-rod inertias adequately, nor did they include considerations of the resulting vibratory and acoustic powers. Expressions for estimating vibrations and noise produced by piston-slap in any type of reciprocating machine are developed in this report. Comparisons are made between calculated and measured sound levels, and reasonable agreement is found. (Author)

AD-439 334 Div. 27, 1, 7
OTS price $2.60

Naval Air Test Center, Patuxent River, Md.
EVALUATION OF THE BREAKERLESS HIGH-FREQUENCY IGNITION SYSTEM IN THE R-1820-82A MODEL ENGINE INSTALLED IN THE S-2D AIRPLANE.
Interim rept. no. 1,
by Roy E. Seaman. 24 Apr 64, 23p.
Task RA1200001
NATC ST33 36R64 Unclassified report

Descriptors: (*Antisubmarine aircraft, Ignition systems), (*Airplane engines, Ignition systems), Semiconductor devices, Naval aircraft, Patrol planes, Switching circuits, Ignition circuits, Diodes (Semiconductor), Flight testing, Performance (Engineering).

creases with increases in rate. About twice as much time per day was spent in corrective maintenance in PACFLT as in CONUS. About 95% of the corrective maintenance time reported for PCFLT was reported by ET2's or lower rates. Amount of direct electronics work time varies with assignment, with men assigned to schools and small ships reporting least. From a total of 584 reports of corrective maintenance, details are presented. (Author)

AD-438 238 Div. 28, 16
OTS price $1.10

Cambridge Univ. (England).
MECHANISMS OF INTEGRATION OF PATTERNS OF BEHAVIOR: A. STUDY OF THE DEVELOPMENT AND INTEGRATION OF NEST BUILDING SKILLS IN CANARIES. B. CHANGES IN RESPONSIVENESS UNDER CONSTANT OR REPETITIVE STIMULATION. C. THE EFFECT OF AUDITORY DEPRIVATION OF BEHAVIOUR.
Final technical rept.,
by R. A. Hinde. 31 Jan 64, 5p.
Grant AF EOAR63 26
AFOSR 64 0736 Unclassified report

Descriptors: (*Behavior, Analysis), (*Birds, Behavior), Hearing, Audiometry, Stimulation, Ecology, Surgery, Hormones, Females, Sensitivity, Reproduction, Deafness, Steroids, Injections.

The role of changes in tactile sensitivity of the brood patch in the integration of nest-building behaviour of female canaries has been studied. This has involved work on the hormonal control of brood-patch development, including injection of steroids into normal and ovariectomised birds. Experiments have also been conducted on the induction of reproduction behaviour in winter. The changes in reproductive behaviour are being correlated with changes in ovarian histology. The moment to moment changes in strength of the mobbing response shown by chaffinches to ows is being analysed and some of the underlying processes isolated. Techniques for the experimental deafening of birds have been investigated. (Author)

AD-438 513 Div. 28
OTS price $2.60

Washington Univ., St. Louis, Mo.
STRUCTURAL FACTORS AND INDIVIDUAL NEEDS IN GROUP BEHAVIOR.
Annual rept.,
by Richard deCharms and Robert L. Hamblin.
Nov 63, 25p.
Contract Nonr81611
Unclassified report

Descriptors: (*Group dynamics, Behavior), Structural properties, Motivation, Personality Abnormal psychology, Theory, Sociometrics, Social communication, Pathology, Leadership, Adjustment psychology, Bibliographies.

AD-438 639 Div. 28
OTS price $1.60

Naval School of Aviation Medicine, Pensacola, Fla.
SEPARATION OF AVIATION OFFICER CANDIDATES FROM CADETS FOR PURPOSES OF PREDICTING VOLUNTARY WITHDRAWALS,
by Richard E. Doll and Robert J. Wherry, Jr.
13 Mar 63, 11p.
NSAM MR005 13 5001R23 Unclassified report

Descriptors: (*Aviation personnel, Motivation), (*Aeronautics, Training), (*Psychometrics, Aviation personnel), Classification, Officer personnel, Mathematical prediction, Psychology, Students, Attention, Analysis, Adjustment (Psychology), Selection.

Prediction of voluntary withdrawal from flight training has been a persistent problem. This study suggests possible reasons for the inefficient prediction of withdrawals and demonstrates that by separating aviation officer candidates and aviation cadets it is possible to obtain a better prediction. (Author)

AD-439 430 Div. 28
OTS price $4.60

Human Resources Research Office, George Washington Univ., Washington, D. C.
PIONEER VI. CONFORMITY TO A GROUP NORM AS A FUNCTION OF SENSORY DEPRIVATION AND SOCIAL ISOLATION,
Research memo.,
by Seward Smith, Thomas I. Myers and Donald B. Murphy. Nov 63, 50p.
Contract DA44 188ARO2
Unclassified report

Descriptors: (*Group dynamics, Sensory deprivation), (*Social communication, Group dynamics), Behavior, Experimental data, Errors, Test methods, Psychometrics.

AD-439 431 Div. 28, 16
OTS price $10.50

George Washington Univ., Washington, D. C.
REPORTED VISUAL SENSATIONS AS A FUNCTION OF SUSTAINED SENSORY DEPRIVATION AND SOCIAL ISOLATION.
Research memo.
by Donald B. Murphy, Thomas I. Myers and Seward Smith. Nov 63, 138p.
Contract DA44 188ARO2
Unclassified report

Descriptors: (*Sensory deprivation, Vision), (*Sleep, Sensory deprivation), (*Reaction (Psychology), Sensory deprivation), Abnormal psychology, Personality, Adjustment (Psychology), Social communication, Experimental data, Psychometrics, Tables, Stimulation, Motor reactions.

AD-439 432 Div. 28
OTS price $8.10

George Washington Univ., Washington, D. C.
PIONEER VI. VIGILANCE AS A FUNCTION OF SENSORY DEPRIVATION AND SOCIAL ISOLATION.
Research Memo
by Thomas I. Myers, Seward Smith and Donald B. Murphy. 1963, 90p.
Contract DA44 188ARO 2
Unclassified report

Descriptors: (*Attention, Sensory deprivation), (*Sensory deprivation, Social communication), Performance tests, Design, Test methods, Psychometrics, Reaction (Psychology), Verbal behavior, Sleep, Motor reactions, Intelligence tests, Tables, Eye, Pathology.

AD-439 610 Div. 28, 23, 26
OTS price $2.60

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
BIBLIOGRAPHY ON MAINTENANCE PERSONNEL PERFORMANCE MEASUREMENT,
by William B. Askren, Jr. Jun 63, 23p.
Proj. 1710, Task 171004
6570 AMRL M P 45 Unclassified report

methods, Experimental data, Behavior, Psychology.

This study was designed to discover whether query and message items are equivalent in their effect on short-term memory in situations where a person is required to process a sequence of messages while concurrently processing queries about them. It was assumed that recall is consistently degraded as the number of items interpolated between a message and its subsequent query increases. It was hypothesized that this degradation is greater for those subsequences with interpolated queries than for those containing messages only. The results showed that interpolated queries do degrade recall significantly more than do messages. (Author)

AD-437 953 Div. 28
OTS price $1.60

Personnel Research Lab. (6570th) Aerospace Medical Div., Lackland Air Force Base, Tex.
COMPARISON OF TEST ITEMS ACROSS FORMS,
by William B. Lecznar. Feb 64, 16p.
Proj. 7717, Task 771705
PRL TDR64 3 Unclassified report

Descriptors: (*Test construction (Psychology), Psychometrics), (*Air force personnel, Intelligence tests), Reasoning, Sampling, Analysis, Classification, Aptitude tests, Selection, Vocabulary.

Repetitive use of a limited number of the same items in subtests of successive forms of the Airman Classification Test permitted comparison of statistics for these items over time. The difficulty level of each item, measured by percentage of examinees marking the right answer, varied with the general ability of the sample as measured by AFQT score. The precise effects of practice from previous testing on similar kinds of material is unknown, but the results suggest that use of anchor items can yield gross estimates of differences in quality of tested groups. Such estimates can best be made from the Arithmetic Reasoning and Work Knowledge subtests, since spatial-visualization and information-type items tended to be more stable across samples. (Author)

AD-437 954 Div. 28
OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
RATINGS BY OFFICER GROUPS OF IMPORTANCE AND OBTAINABILITY OF SELECTED JOB CHARACTERISTICS,
by Robert L. Downey, Jr., Francis D. Harding and Robert A. Bottenberg. Feb 64, 14p.
Proj. 6755, Task 675501
PRL TDR64 4 Unclassified report

Descriptors: (*Military personnel, Job analysis), (*Attitudes, Analysis), (*Psychometrics, Attitudes), Mathematical analysis, Officer personnel, Military psychology, Behavior, Students, Armed forces (United States), Scientific personnel, Group dynamics, Tables, Aging (Physiology), Air Force.

To determine how different groups of officers value an Air Force career, 22 possible job rewards were rated by 1300 former AFIT students as to their importance and the possibility of obtaining them as Air Force officers. Responses were analyzed by 4 dichotomous groupings: (1) active duty officers vs those who had resigned or retired; (2) scientific and engineering officers vs nonscientists; (3) young officers vs older officers; and (4) rated vs nonrated officers. Differences in ratings by the paired groups were evaluated by computing an overall chi square for the distributions on each job characteristic. Rewards rated as most attainable were rated as least important. Distributions of the ratings differed significantly. (Author)

AD-438 209 Div. 28
OTS price $7.60

Serendipity Associates, Los Angeles, Calif.
A SURVEY OF HUMAN FACTORS ENGINEERING PROBLEMS IN FIREFIGHTING EQUIPMENT,
by Harold E. Price, Carleton L. Crain and Frank A. Siciliani. Feb 64, 75p.
Contract OCD PS64 3
Unclassified report

Descriptors: (*Human engineering, Firefighting vehicles), (*Firefighting vehicles, Human engineering), Performance tests, Fire control computers, Communication systems, Fires, Effectiveness, Fire pumps, Hose, Fittings, Breathing apparatus, Detection, Vision, Control panel, Anthropometry, Training, Coding, Leadership, Operation.

A survey of human factors engineering problems in firefighting equipment is presented with discussions and photographs of specific problem areas. Methods utilized to gather and evaluate the data are discussed. A general discussion of eight problem areas is presented and specific problems within each problem area are identified, and discussed. Suggested solutions or approaches to solutions are presented for some of the specific problems. Problem areas which may not be human factors engineering problems, but are closely related are also presented. The related problem areas include (1) systems integration, (2) detection and reporting of fires, and (3) communications. The basic conclusion of the study is that human factors engineering problems do exist in fire fighting equipment and that human factors engineering is not given formal recognition in the design and procurement of firefighting equipment. Recommendations are given with respect to (1) potential modification of existing equipment and (2) desirable human factors engineering studies. (Author)

AD-438 215 Div. 28, 23, 26
OTS price $2.60

Naval Personnel Research Activity, San Diego, Calif.
TRAINING, UTILIZATION, AND PROFICIENCY OF NAVY ELECTRONICS TECHNICIANS. V. WORK DIARIES,
by Adolph V. Anderson. Nov 62, 26p.
NAVPERS TB62 17 Unclassified report

Descriptors: (*Electronics, Naval personnel), (*Naval personnel, Electronics), (*Maintenance, Naval personnel), Training, Personnel management, Scheduling, Effectiveness, Performance tests, Psychometrics, Classification, Mathematical analysis, Military publications, Maintenance personnel, Tables, Test equipment, Job analysis, Instrumentation.

This series is a result of a survey conducted in the Pacific Fleet and the western United States during the first half of 1961. A five-day work diary was completed by 382 (92%) of the 415 ET's included in the survey. The diary, covering a period of five week-days, provided for a complete accounting of time in various specified categories including detailed reports of corrective maintenance performed. About a fourth of ET total work time is devoted to direct electronic maintenance activities. Above the ET3 level, time spent in direct maintenance activities de-

AD-437 918 Div. 30
OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
INSTRUCTIONS FOR USING IBM 709 PLOTTING SUBROUTINES,
by I. E. Rucker. Apr 64, 23p.
PA TM1401 Unclassified report

Descriptors: (*Digital computers, Plotters), Automatic, Input-output devices, Magnetic tape, Programming languages.

Directions are given for plotting high quality graphs automatically using the CALCOMP digital plotter installed in the Computing and Analysis Branch, ESL. The report describes the use of a special set of IBM 709/7090, FORTRAN/FAP subroutines which automatically generate output (a binary magnetic tape) which is then processed by the CALCOMP digital plotter. (Author)

AD-437 924 Div. 30
OTS price $8.60

ITT Data and Information Systems Div., Paramus, N. J.
AN INVESTIGATION OF THE TECHNIQUES AND CONCEPTS OF INFORMATION RETRIEVAL.
Quarterly rept. no. 6, 1 Oct-31 Dec 63,
by Jacques Harlow. 31 Jan 64, 91p. TR5201TR0078
Contract DA36 039sc90787
Unclassified report

Report on Research in Information Retrieval.

Descriptors: (*Information retrieval , Theory), (*Documentation, Reviews), Game theory, Probability, Optimization, Sampling, Languages, Programming languages, Computer logic, Subject indexing, Abstracts, Data processing systems, Data storage systems.

This report discusses the work performed on the project to investigate the techniques and concepts of information retrieval and to formulate and develop a general theory of information retrieval. The formalization of this theory is oriented to the automation of large-capacity information storage and retrieval systems. This theoretical framework will be the basis for the use of general purpose stored-program digital computer systems to perform the storage and retrieval functions. (Author)

AD-437 938 Div. 30, 25
OTS price $2.60

Motorola Inc., Phoenix, Ariz.
EPITAXIAL CONTROL SYSTEM,
by Don M. Jackson, Jr., 14 Dec 63, 26p. SR no. 5
Contract AF19 604 8351, Proj. 5621, Task 562103
AFCRL 64 178 Unclassified report

Descriptors: (*Epitaxial growth, Impurities), (*Impurities, Monitors), (*Gas analysis, Epitaxial growth), Hydrogen, Silicon, Gas flow, Mass spectroscopy, Samplers, Calibration, Control systems, Crystal growth, Phosphorus, Arsenic, Boron.

The epitaxial vapor analysis system development progressed to a point near completion. Several notable features were incorporated in the system. The new batch sampling section was breadboarded and found to operate satisfactorally. With batch sampling, gas impurity levels of 0.5 ppm were easily monitored and it is likely that 5 ppb levels can be subject to monitor. The system can be used with either linear or logarithmic ion current readout. The epitaxial gas control section neared completion. This section will allow sampling over a wide range of doping levels at various points in the gas flow system. (Author)

AD-438 221 Div. 30, 8
OTS price $3.60

ACF Electronics Div., ACF Industries, Inc., Paramus, N. J.
L-BAND RADIOMETER TYPE 507,
by Zenon Bilyk. 9 Mar 64, 37p. Rept. no. SR2; AR1679
Contract AF19 604 8821, Proj. 4642, Task 464201
AFCRL 64 252 Unclassified report

Descriptors: (*Radiometers, L-band), Antennas, Electric switches, Radiofrequency Intermediate frequency amplifiers, Audio amplifiers, Thermistors, Radiofrequency oscillators, Relaxation oscillators, Integrated circuits, Stagnation point, Plasma sheath, Atmosphere entry, Noise (Radio), Plasma medium, Temperature, Monitors.

AD-438 255 Div. 30, 15
OTS price $1.60

Naval Personnel Research Activity, San Diego, Calif.
USE OF AUTOMATED INSTRUCTION IN REVIEW MATHEMATICS FOR THE BASIC SONARMAN COURSE (C-560),
by Eugenia N. Kemp. Jan 64, 14p.
NAVPERS TB64 1 Unclassified report

Descriptors: (*Teaching machines, Mathematics), (*Education, Sonar personnel), Sonar, Naval personnel, Training, Electricity, Electronics, Algebra, Errors, Tables.

Ability to use certain fundamental mathematical processes is considered necessary for acquiring the knowledge of electricity and electronics taught in the Basic Sonarman Course, C-560, given at the Fleet Anti-Submarine Warfare School, San Diego. Refresher training in mathematics is given to all new students after normal school hours during the first four weeks of Course C-560 If this refresher training could be programed for independent self-study, distinct advantages would accrue such as reducing the instructor load, making possible individual study immediately after the student arrives at the school, and permitting differential training for differing individual needs. This study was conducted to determine whether the development of programed materials for the refresher training would be feasible and whether these materials would be as effective as the conventional instruction. Three of the areas covered in the mathematics review were programed. (Author)

AD-438 438 Div. 30, 15
OTS price $1.60

RAND Corp., Santa Monica, Calif.
SOME DIRECTIONS OF RESEARCH IN DYNAMIC PROGRAMMING,
by Richard Bellman. Apr 64, 19p. Memo. no. RM3661PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Programming (Computers), Scientific research), Theory, Algebra, Scheduling, Computers, Computer logic, Decision making, Perturbation theory, Control system, Mathematical logic, Mathematical analysis.

Report on Training, Personnel and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Maintenance personnel, Performance tests), (*Bibliographies, Performance tests), (*Psychometrics, Maintenance personnel), Training, Electronics.

This report lists 116 articles related to measuring the performance of maintenance personnel. The articles are grouped into three categories of electronic maintenance, general maintenance, and general information on performance measurement. The bibliography was compiled primarily by a search of 17 different descriptors of the Defense Documentation Center, and 13 areas of the Psychological Abstracts from 1942 through 1962. Various other sources also were screened. The eleven most ''productive'' researchers in the area of performance measurement were determined by analysis of the bibliography. The distribution of references by year of publication was tabulated and graphed. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-437 928 Div. 29
OTS price $4.60

Army Quartermaster Research and Engineering Field Evaluation Agency, Fort Lee, Va.
SPECIAL STUDY OF A METHOD FOR OBJECTIVELY DETECTING THE INSTANT AND LOCATION OF RAINFALL PENETRATION THROUGH FIELD CLOTHING.
Final rept.,
by James C. Perkins, Jr. Apr 64, 42p.
Projs. 1E650212D460, 7 3 0903 01E
Unclassified report

Descriptors: (*Rainfall, Protective clothing), (*Clothing, Permeability), Penetration, Moisture, Detectors, Visual inspection, Materials, Design.

The present standard test method employed by the Field Evaluation Agency to compare and evaluate water resistance characteristics of various types of field clothing consists essentially of periodic visual inspections by test observers to dedetermine the incidence and location of water penetration. The experimental leak detection system consists of a wired, multicircuit, sensing element designed to be worn under wet weather garments, and a portable moisture detecting and signaling device. Three different experimental sensing element vests--designated Type A, Type B, and Type C--were constructed and evaluated during this study. Test results show that the experimental moisture detection system is a satisfactory method for objectively detecting and locating, on a continuous basis, rainfall penetration through field clothing. (Author)

AD-438 008 Div. 29
OTS price $5.60

Army Natick Labs., Mass.
REFERENCE MANUAL ON TENTAGE.
Feb 64, 58p.
Unclassified report

Descriptors: (*Tents, Army equipment), (*Army equipment, Specifications), (*Specifications, Handbooks), (*Handbooks, Tents), Hangars, Radomes, Maintenance equipment, Vehicles, Aircraft, Guided missiles.

This manual updates the information contained in the report entitled, A Survey of Tentage Commonly Used in the United States Army, printed in June 1962. The purpose of this manual is to fimiliarize the various Army elements with the nomenclature, design, purpose, etc., of present standard tentage. Included also are some of the experimental tents currently in the user test phase of development which show promise of early adoption as standard items. It is thought that the basic technical data provided for each tent will be not only useful reference material, but will also be of assistance in determining and selecting the tent required from those available in the supply system. (Author)

AD-439 633 Div. 29
OTS price $1.10

Technical Operations Inc., Washington, D. C.
PROTECTION FACTORS OF EMERGENCY SHELTERS IN A BRITISH RESIDENCE.
Summary research rept.
by M. J. Barrett. Feb 64, 4p.
Contract OCD OS62 14
Unclassified report

Descriptors: (*Shelters, Great Britain), (*Protective coverings, Shelters), (*Civil Defense system, Operation), Design, Population, Theory, Structures, Radiation effects, Steel, Radioactive fallout, Instrumentation, Tables.

30. RESEARCH AND RESEARCH EQUIPMENT

AD-437 907 Div. 30
OTS price $4.60

Polarad Electronics Corp., Long Island City, N. Y.
RADIO INTERFERENCE MEASURING SET AN/TRM-6(XA-3).
Final engineering rept.
Mar 64, 42p.
Contract AF33 600 41420, Proj. 4357, Task 435711
AL TDR64 30 Unclassified report

Descriptors: (*Interference analyzers, Radiofrequency interference), (*Test sets, Interference analyzers), (*Radiofrequency interference, Test sets), Modification kits, Tuning devices, Super high frequency, Waveguides, Antenna components, Compatibility, Attenuators, Standing wave ratios, Horn antennas, Antenna radiation patterns, Gain, Preamplifiers, Performance (Engineering).

The purpose of this work was to extend the frequency range of Radio Interference Measuring Set AN/TRM6(XA-2) from its upper limit of 10 gc to a new upper limit of 21 gc. This purpose was accomplished by the design, development, and prototype production of two additional Calibrator Converter Tuning Units FR-160(XA-1)/TRM-6 and FR-161(XA-1)/TRM-6 that covered the frequency range of 10 to 21 gc and the required waveguide and antenna components for their operation. The added units and components are compatible with AN/TRM-6)XA-2), and the resulting assemblage, which covers the frequency range from 1 to 21 gc, is identified as AN/TRM-6(XA-3). (Author)

coil gage in its present form is not suitable. The new coil-plate gage can be operated with the same auxiliary electronics used with the four-coil gage. The gage consists of two bifilarly wound coils and two conducting plates and associated electronic instrumentation. On bifilar coil and plate is embedded in soil as the strain sensing element; the other coil and plate is externally positioned on an adjustable precision mount to serve as a reference. The principle of operation is that of a series adding transformer having its secondary connected to an open circuit-null balancing system to permit accurate measurements of small strains. Measurements can be made close to boundaries and to materials exihibiting magnetic properties. (Author)

AD-438 836 Div. 30
OTS price $11.50

Department of the Navy, Washington, D. C.
NAVIC POL INFORMATION SYSTEM. CAPABILITY EXPANSION FOR CONSUMPTION DATA, PROGRAMMERS, USERS, AND OPERATORS MANUAL,
by G. Norman, C. Bremer, R. Steele and A. Sawitz. 31 Jan 64, 151p.
Proj. 44L003A
NCSSA 119 Unclassified report

Descriptors: (*Programming (Computers), Handbooks), (*Data processing systems, Information retrieval), Fuel oil.

This system maintains a file of all vessel type/class distinctions in the Navy with the associated consumption factors for all knot rates from zero thru thirty-two. It also produces reports displaying Navy Special Fuel Oil and Diesel Fuel requirements on a type/class, task force, fleet and total Navy basis, given a particular vessel and speed/time distribution. These results are used for evaluation of existing Prepositioned War Reserve Stock levels and for projecting fuel requirements for various force distributions. (Author)

AD-438 846 Div. 30
OTS price $4.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
ABSTRACTS OF USAPRO RESEARCH PUBLICATIONS--FY 1963,
by Emma E. Brown. Oct 63, 36p.
Army Proj. 2J024701A722; 2J024701A723
APRO TRN138 Unclassified report

Descriptors: (*Scientific research, Abstracts), (*Abstracts, Scientific research), (*Personnel, Scientific research), Images, Human engineering, Personnel management, Maintenance, Maintenance personnel, Warfare.

AD-439 014 Div. 30
OTS price $8.10

Ohio State U., Research Foundation, Columbus.
AN ALGORITHM FOR SYNTHESIZING NOR LOGIC CIRCUITS,
by Donald Theado. 28 Feb 64, 81p. Rept. no. 1222 21
Contract AF33 616 7843, Proj. 4144, Task 414408
Unclassified report

Descriptors: (*Computer logic, Synthesis), Digital computers, Circuits, Networks, Transistors, Switching circuits.

The problem of synthesizing NOR and NAND logic diagrams for the generation of logic functions is studied and a technique is presented. The synthesis procedure is so developed that it can be carried out manually or by using a digital computer. (Author)

AD-439 090 Div. 30
OTS price $2.60

Technische Hóchschule, Munich (Germany).
ELF INVESTIGATIONS.
Summary rept. no. 1, 1 Apr 62-30 June 63,
by H. L. Konig. 30 June 63, 24p.
Contract AF61 052 603
AFCRL 64 81 Unclassified report

Descriptors: (*Magnetic fields, Measurement), (*Measuring devices (Electrical and electronic), Magnetic fields), (*Time signals, Generators), Extremely low frequency, Rhode Island, West Germany, Synchronization (Electronics), Clocks, Transistors, Mechanical drawings, Recording paper, Earth, Atmosphere, Instrumentation, Trigger circuits.

Two observation stations, one in Munich, Germany and the other in Kingston, R. I., USA, are being used to observe the fluctuations of the Earth magnetic field in the frequency region around 10 cps. A time mark generator herein described in detail has been developed for the purpose of putting synchronised time marks triggered by an ordinary mechanical clock on the paper tape records with a precision of 0.0002 to 0.0005. (Author)

AD-439 200 Div. 30
OTS price $12.50

Aerial Measurements Lab., Northwestern Univ., Evanston, Ill.
TELEMETRY AND COMMAND DESTRUCT TECHNIQUES.
Final rept. Mar 63-Mar 64,
by James S. Aagaard and Rodney J. Schaid. Feb 64, 178p. Memo 401
Contract AF33 657 11001, Proj. 4107, Task 410711
AL TDR64 52 Unclassified report

Descriptors: (*Telemeter systems, Documentation), Information retrieval, Indexes, Input-output devices, Research program administration, Coding, Programming (Computers), Periodicals, Punched cards.

The Literature Search and Documentation Plan phases of the work discussed herein were conducted in an attempt to develop a system of abstracted, indexed, and advanced telemetry information in support of Air Force needs. Review of current periodicals was conducted simultaneously with the development of formalized procedures for reviewing, abstracting and indexing. Approximately 1200 articles and technical documents were reviewed during the course of this work. Their information was abstracted and indexed using a Northwestern University modification of the Keyword-in-Context (KWIC) indexing system for the IBM 709 computer which produced Keyword, Bibliographic and Author listings at the end of the third quarter. The values of these (approximately 5400 entries) listings has been demonstrated by their use on a QRC (Quick Reaction Capability) trial run investigating the state-of-the-art of preamplifiers for use in telemetry receiving links. (Author)

AD-439 333 Div. 30, 26
OTS price $3.60

RAND Corp., Santa Monica, Calif.
FUTURE TRENDS IN AIR FORCE DATA SYSTEMS,

In this paper, the author indicates areas of research and some interesting and significant problems which arise in the attempt to use a certain functional equation as an effective algorithm in the study of multistage decision processes. (Author)

AD-438 559 Div. 30
OTS price $9.10

RCA Labs., Div. of Radio Corp. of America, Princeton, N. J.
AN ANALYSIS OF AN APPROXIMATE SEQUENTIAL PROCEDURE FOR INTERVAL ESTIMATION,
by D. A. Walters. July 63, 106p. Rept. no. TN1
Contract AF49 638 1184
AFOSR 5155 Unclassified report

Report on Automatic Theory Formation.

Descriptors: (*Artificial intelligence, Optimization), Sequential analysis, Statistical tests, Sampling, Errors, Probability, Statistical analysis, Statistical processes, Decision making, Difference equations, Automata.

This report presents an approximate sequential method of interval estimation suitable for hypothesis testing in current research in artificial intelligence, a study of its properties, and a method of choosing parameter values to maximize its effectiveness. Relationships were found between the parameters of the procedure and its significant properties, including the probabilities of the two types of error and the expected number of samples required by the process. Several sets of parameters were chosen. (Author)

AD-438 662 Div. 30
OTS price $6.60

Pittsburgh Univ., Pa.
A METHOD FOR IMPROVING COMPREHENSION OF TECHNICAL COMMUNICATIONS THROUGH STATISTICAL TESTING AND INFORMATION RETRIEVAL PROCEDURES,
by Terrence Eugene Hobbs. 1964, 63p.
Unclassified report

Master's thesis.

Descriptors: (*Information retrieval, Reports), (*Documentation, Statistical analysis), (*Game theory, Information theory), Communication theory, Language, Dictionaries, Testing, Scientific research, Data processing systems, Programming (Computers), Game theory.

When words, symbols and figures are committed to writing, it is generally done with the intent of transmitting the writer's thoughts to those of others. The success of this intent is contingent upon a multitude of variables. This paper examines a few of the variables which determine techniques for transmitting information as applied to the specific field of technical writing. There is no attention directed to the communication of emotions, philosophies and the like. Rather, attention is directed to the communication of specific ideas, through writing, related to technical type subjects. (Author)

AD-438 705 Div. 30
OTS price $21.00

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
THE LOGIC DESIGN OF ADAM, A PROBLEM-ORIENTED SYMBOL PROCESSOR.
Final rept.,
by R. F. Schauer and A. P. Mullery. 19 Aug 63, 364p.
Contract AF19 628 1621, Proj. 4641, Task 464105
AFCRL 63 510 Unclassified report

Descriptors: (*Programming languages, Data processing systems), (*Programming (Computers), Handbooks), (*Computer logic, Design), Control sequences, Pattern recognition.

This report presents a general description of the language and a detailed design of a machine organization having the following characteristics: complete symbolic addressing on variable field length data; list and string operations; high to low order numeric processing; dynamic storage allocation; and automatic input/output. The design is described in terms of the algorithms used to implement the machine function or in the logic itself where the former approach was not appropriate. A programming manual is presented as Appendix I. The logical design of the complete system is contained in Appendix II. (Author)

AD-438 784 Div. 30
OTS price $11.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ARITHMETIC UNITS FOR ELECTRONIC DIGITAL COMPUTERS (Arifmeticheskiye Ustroystva Elektronnykh Tsifrovykh Mashin),
by M. A. Kartsev. Mar 60, 158p.
FTD MCL 285 Unclassified report

Descriptors: (*Digital computers, Textbooks), Number theory, Coding, Classification, Binary arithmetic, Computer logic, Design, USSR.

This textbook examines general questions in the design of arithmetic units: selection of the system of numeric coding, design of binary adders, methods of performing multiplication and division in the binary system of notation, and the logical circuits of arithmetic units. Along with a description of familiar variants, methods of comparative evaluation are discussed, as are certain new designs. This book is planned for use by scientific researchers and engineers engaged in the designing of electronic digital computers, and for students in the final years of higher educational institutions. (Author)

AD-438 826 Div. 30
OTS price $4.60

ITT Research Inst., Chicago, Ill.
DEVELOPMENT OF A SOIL STRAIN GAGE FOR LABORATORY DYNAMIC TESTS.
Final rept., 1 Mar-31 Dec 63,
by Robert W. Keller and Marvin E. Anderson.
Apr 64, 43p.
Contract AF29 601 5343, Proj. 1080, Task 108006
WL TDR64 7 Unclassified report

Descriptors: (*Soils, Strain gages), (*Strain gages, Soils), Coils, Strain (Mechanics), Electronic equipment, Instrumentation, Transformers, Measurement, Soil mechanics, Mechanical drawings, Transistors, Electric bridges, Power supplies, Electrodes.

A 'four-coil' soil strain gage was developed for measurements in laboratory samples subjected to static or dynamic loads. This report covers work done under a program for continued gage development and modifications which have resulted in the 'coil-plate' gage. The coil-plate gage can be used for applications for which the four-

AD-439 664 Div. 30, 8
OTS price $5.60

Remington Rand, Univac. Div., Sperry Rand Corp., Philadelphia, Pa.
SYNTHESIS OF LOGIC FUNCTIONS ON AN ARRAY OF INTEGRATED CIRCUITS,
by L. M. Spandorfer and J. V. Murphy. 31 Oct 63, 56p. Rept. no. SRI
Contract AF19 628 2907, Proj. 4645, Task 464504
AFCRL 63 528 Unclassified report

Descriptors: (*Computer logic, Synthesis), Circuits, Design, Gates (Circuits), Models (Simulation), Switching circuits, Functions.

This paper considers the problem of synthesizing large-scale logic on an array of microcircuits with particular attention to topological aspects arising from the interconnection and crossover problems. The results are applicable to semiconductor, thin-film, and hybrid microcircuits. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-438 143 Div. 31
OTS price $1.25

Stanford Research Inst., Menlo Park, Calif.
DEVELOPMENT OF AUTOMATICALLY HARDENING SHOCK MOUNTS.
Final rept.,
by S. K. Oleson and J. J. Eige. Sep 63, 49p.
Contract NObs86699, SRI Proj. PHU4109, Proj. SF013 11 01, Task 1358
Unclassified report

Descriptors: (*Ship auxiliary equipment, Vibration isolators), (*Vibration isolators, Physical properties), (*Underwater explosions, Vibration isolators), (*Fluids, Vibration isolators), (*Electrical properties, Fluids), Electric fields, Silicon compounds, Dioxides, Gels, Piezoelectric transducers, Voltage, Excitation, Plasticity, Shear stresses.

Initial applied research was conducted to provide a means of temporarily placing shipboard equipment in a hard-mounted posture during explosive attack. The approach is based on the use of a class of electrically active fluids which became solid or semisolid when an electric field is applied. To make the action entirely automatic, the electric field is supplied by piezoids that are activated by the shock wave produced by an explosion. The applied research consisted of three principal tasks: (1) design of suitable electrohydraulic damping mechanisms based on the properties of electric-fluids now available; (2) application of piezoelectric ceramics to supply the electric field required by a given electrohydraulic damper based on the acoustic energy available in the shock wave; and (3) construction and testing of an electrohydraulic device demonstrating the overall principles of an automatically hardening (auto-hardening) shock mount system. The investigation showed that: (1) electrohydraulic dampers can be designed to meet the requirements of small shock mount systems (0 to 2,000 lb static loads); (2) electrohydraulic dampers for large shock mount systems (2,000 to 10,000 lb static load) require further study and compromises in (a) the permissible space which can be allotted for dampers, (b) the viscous damping inherent in the device, and (c) the electrical energy required by the damper. (Author)

AD-438 811 Div. 31, 2
OTS price $11.50

McDermott (J. Ray) Co., Inc., New Orleans, La.
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH & DEVELOPMENT STATION (FORDS). VOLUME I.
Phase 1A rept.
1 Apr 64, 1v.
Contract NBy37640
Unclassified report

Descriptors: (*Barges, Oceanographic equipment), (*Floats, Oceanographic equipment), Structures, Hoists, Oceanology, Transducers, Floating docks, Piers, Stability, Handling, Cables (Mechanical), Wire, Measurement, Hydraulic systems, Cost, Steel, Pipes, Feasibility studies.

The purpose of this study was to analyze the Naval Research Laboratory Concept of the floating stable platform and to modify this configuration as required to insure that it meet the specific criteria as set forth. Upon completion of this analysis, the feasibility of providing such a station was to be determined. In addition to analyzing the NRL Concept, it was the purpose of this study to investigate other basic concepts which may provide a more economical or practicable (or both) station which would meet the basic requirements. By conducting the study in this manner, the results would be the determination of the optimum station configuration to accomplish the end envisioned. (Author)

AD-438 812 Div. 31
OTS price $18.50

McDermott, J. Ray, and Co., Inc., New Orleans, La.
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH AND DEVELOPMENT STATION (FORDS), VOLUME II, PHASE 1A.
1 Apr 64, 298p.
Contract NBy37640
Unclassified report

Descriptors: (*Barges, Oceanographic equipment), Hoists, Floats, Floating docks, Structures, Supports, Power, Fuels, Water, Storage, Wind, Hydrostatics, Motion, Marine surface propulsion, Housing, Personnel, Design, Air conditioning equipment, Pipes, Anchors (Marine), Ship structural components, Costs, Piers, Mechanical drawings.

AD-438 813 Div. 31, 2
OTS price $14.50

McDermott (J. Ray) Co., Inc., New Orleans, La.
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH AND DEVELOPMENT STATION (FORDS). VOLUME III.
Phase 1A rept.
1 Apr 64, 1v.
Contract NBy37640
Unclassified report

Descriptors: (*Floats, Oceanographic equipment), (*Barges, Oceanographic equipment), Hoists, Cables (Mechanical), Bibliographies, Load distribution, Ocean currents, Tensile properties, Hulls (Marine), Hydrostatics, Stability, Motion, Moments of inertia, Water waves, Roll, Force (Mechanics), Moments, Ocean waves, Piers, Pressure, Oceanology, Feasibility studies.

AD-438 814 Div. 31
OTS price $13.00

McDermott, J. Ray, and Co., Inc., New Orleans, La.
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH

by R. L. VanHorn. May 64, 33p. Rept. no. RM3924 PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Data processing systems, Air Force), (*Management engineering, Data processing systems), Electronics, Scheduling, Maintenance, Models (Simulations), Logistics; Management engineering, Job analysis, Computers.

AD-439 345 Div. 30, 25, 32
OTS price $17.00

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
(No title).
Quarterly progress rept. no. 73.
15 Apr 64, 268p.
Contract DA36 039AMC03200E, Grant DA SIG36 039 61G14
Unclassified report

Descriptors: (*Reports, Scientific research), Magnetohydrodynamics, Plasma physics, Acoustics, Geophysics, Infrared spectroscopy, Radio astronomy, Microwave spectroscopy, Molecular beams, Communication theory, Speech transmission, Biophysics, Neurology, Artificial intelligence.

AD-439 418 Div. 30
OTS price $10.10

Computronics, Inc., Teaneck, N. J.
SIMULATION SYSTEM PROGRAMMING DESIGN MANUAL.
Dec 63, 127p.
Contract N61339 1089
NTDC 1089 1 Unclassified report

Descriptors: (*Simulation, Programming (Computers)), (*Programming (Computers), Simulation), (*Design, Simulation), Analysis, Training devices, Systems engineering, Equations, Command and control systems, Digital computers, Mathematical models, Dynamics, Control.

This manual treats the system-analysis and computer-programming problems of real-time system simulation. The topics considered are applicable to system simulation for design, analysis, or training purposes. Emphasis is placed on real-time applications because of the special constraints imposed on the digital computer by real-time use. The technical discussion covers concepts and techniques applicable to a broad range of simulation problems. System analysis, real-time digital computer systems, mathematical models, equations, dynamics, kinematic and empirical, input/output program design, control program design nand program writing are among the technical areas covered. Project management and control are treated as a separate topic. (Author)

AD-439 439 Div. 30, 15
OTS price $4.60

Coordinated Science Lab., U., of Illinois, Urbana.
SPEED INDEPENDENT NOR REALIZATIONS,
by Kenneth E. Batcher. May 64, 48p. Rept. no. R 205
Contract DA28 043AMC00073E
Unclassified report

Descriptors: (*Switching circuits, Sequences), (*Networks, Sequential analysis), Set theory, Scheduling, Mathematical logic, Delay lines.

AD-439 524 Div. 30, 16
OTS price $1.10

Rand Corp., Santa Monica, Calif.
SEPARATING RESEARCH FROM RESEARCH AND DEVELOPMENT,
by David Novick. May 64, 9p. Rept. no. P 2907
Unclassified report

Descriptors: (*Scientific research, Analysis), (*Penicillins, History), Budgets, Costs, Research program administration.

AD-439 617 Div. 30
OTS price $4.60

Royal Inst. of Tech., Stockholm (Sweden).
(No title).
Quarterly progress and status rept. no. 13, July-Sep 63.
15 Oct 63, 43p. Rept. no. STL QPSR3 1963
Contract DA91 591EUC3080; Grant AF E OAR63 55
AFCRL 64 15 Unclassified report

Descriptors: (*Speech, Analysis), (*Spectrum analyzers, Speech), Sweden, Great Britain, Frequency, Acoustics, Photographs.

A general study of Swedish and English speech material has started with a view of collecting a representative set of spectrograms and supplementary acoustic records of a selected set of vowel and consonant allophones. The analysis is confined to the frequency range 0-4800 c/s and the original Sonagrams were taken at a scale of 2 cm per kilocycle. The time scale is consistently calibrated with respect to the explosion phase of the release. (Author)

AD-439 624 Div. 30
OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE EQUILIBRIUM TEMPERATURE PROBE. A DEVICE FOR MEASURING TEMPERATURES IN HYPERSONIC BOUNDARY LAYERS,
by James E. Danberg. 4 Dec 61, 25p.
NOL TR61 2; ARR146 Unclassified report

Descriptors: (*Hypersonic wind tunnels, Temperature sensitive elements), (*Thermocouples, Hypersonic flow), Conical bodies, Boundary layer, Surface temperatures, Design, Turbulent boundary layer, Temperature.

The equilibrium temperature probe is a device which may be used to determine the flow temperature in a hypersonic boundary layer. It consists of a sharp, small angled cone of low emissivity metal supported by a thermal insulator. A thermocouple is installed to measure the cone temperature. The cone is held with its axis parallel to the flow. Ideally, the indicated temperature is the adiabatic wall temperature, a property of the flow which when combined with other more easily obtained properties and established relationships provides sufficient information to determine the total temperature of the flow. The equilibrium temperature probe can be made very small without excessive conduction and radiation effects. This is the main advantage obtained from using the equilibrium temperature probe over the conventional total-temperature probe. In addition, the conical configuration minimizes the probe's interference with the flow. (Author)

information concerning these measurements is voluminous and may be found in many publications. Structureborne (solidborne) noise measurements will be the prime interest, and the best state of the art techniques of measurement and analysis will be directed toward the technician and engineer. (Author)

AD-439 588 Div. 31
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
EXPLORATORY INVESTIGATION OF NONWELDED PRESSURE HULLS FOR HYDROSPACE VEHICLES,
by Arthur C. Macurdy. Mar 64, 24p.
Proj. S R011 01 01
DTMB 1762 Unclassified report

Descriptors: (*Submarine hulls, Hydrostatic pressure), Stiffened cylinders, Pressure vessels, Rings, Aluminum alloys, Titanium alloys, Steel, Plastics, Glass, Strain (Mechanics), Joints, Cylindrical bodies, Model tests.

The feasibility of fabricating a deep-submergence pressure hull composed of rings joined by means other than welding was explored in tests of three structural models (two of aluminum and one of titanium) designed for a collapse strength of 10,000 psi. These tests demonstrated that hulls can be built without welding and that these hulls can have collapse strengths comparable to monolithic hulls. Longitudinal strength, watertight integrity, and corrosion protection, which were not explored by these tests, can be provided by any of several mechanical techniques without compromising collapse strength. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-438 025 Div. 32
OTS price $1.60

Minnesota Univ., Minneapolis.
THE SERVICE-RELATED EXPERIENCE OF A SAMPLE OF JUVENILE DELINQUENTS. II. A REPLICATION ON A LARGER SAMPLE IN ANOTHER STATE,
by Merrill Roff. Dec 63, 15p. Rept. no. 63 2
Contract DA49 007MD2015, PHS Grant MH02218
Unclassified report

Descriptors: (*Criminology, Children), History, Analysis, Aptitude tests, Recruiting, Military training, Selection, Tables, Army, Navy, Air Force, Sampling, Military personnel.

A follow-up study has been made of a sample of former junenile delinquents from a metropolitan area in Minnesota who later entered the Army, Navy, Air Force or Marines. Tables giving reasons for rejection and deferral, the numbers in different branches of service, and outcome in service, are presented both for this sample and a sample from another state studied earlier. Outcome in the different branches of service is tabulated for categories ranging from those reaching and retaining at least non commissioned status to those who were unsatisfactory in service asindicated by type of discharge. Information concerning length of service of men in the different branches is presented and related both to promotion and unsatisfactory outcome. (Author)

AD-438 177 Div. 32, 20, 16
OTS price $22.25

Lockheed Aircraft Corp., Sunnyvale, Calif.
RADIATION EFFECTS UPON EXPERIMENTAL ANIMALS, MAN, AND PLANTS: AN ANNOTATED BIBLIOGRAPHY. VOL II, M-Z,
comp. by Jack B. Goldman. Jan 63, 441p.
Rept. no. 5 10 62 54; SB 62 60
Unclassified report

Descriptors: (*Bibliographies, Radiation effects), (*Radiation effects, Bibliographies), Animals, Man, Plants, Therapy, Food, Toxicity, Radiation sickness, Histology, Diagnosis.

AD-438 178 Div. 32, 20, 16
OTS price $22.25

Lockheed Aircraft Corp., Sunnyvale, Calif.
RADIATION EFFECTS UPON EXPERIMENTAL ANIMALS, MAN, AND PLANTS: AN ANNOTATED BIBLIOGRAPHY. VOL. 1, A-L,
comp. by Jack B. Goldmann. Jan 63, 440p. Rept. no. 5 10 62 54; SB 62 60
Unclassified report

Descriptors: (*Bibliographies, Radiation effects), (*Radiation effects, Bibliographies), Man, Animals, Plants, Food, Radiation sickness, Therapy, Diagnosis, Whole body irradiation, Sensitivity, Biochemistry, Toxicity.

The scope of this annotated bibliography is comprehensive, but not exhaustive. The 2203 references reflect the volume of literature available in English and foreign languages (june 1961-June 1962) in the sequential order indicated by the title. Lethal doses, genetic effects, illness and decrease of life span are some of the subject areas which are identified with the experimental animals, man and plants. An author indes is included. (Author)

AD-438 417 Div. 32, 30
OTS price $3.60

Inforonics Inc., Maynard, Mass.
TEXT REPORTING AND EDITING DEVICE.
Final rept.,
by William R. Nugent. Apr 64, 32p.
Contract AF30 602 3088, Proj. 4594, Task 459402
RADC TDR64 31 Unclassified report

Descriptors: (*Reading machines, Automation), Documentation, Periodicals, Punched tape, Input-output devices, Typewriters, Operation, Corrections, Display systems, Computer logic, Circuits.

An experimental model of an automated aid to editing of textual matter in machinable form has been designed and constructed. The principal purpose of this work is to demonstrate the usefulness and need for small scale, inexpensive editing devices. Off-line special editing devices can provide a high percentage of computer capability in editing for a low percentage of computer cost due to the comparatively lower requirement of complexity and speed. (Author)

AD-438 920 Div. 32
OTS price $9.10

Georgetown Univ., Washington, D. C.
THE ROLE OF THE INDONESIAN ARMY IN POLITICS,
by William E. Pickens, III. 17 Feb 64, 102p.
Unclassified report

AND DEVELOPMENT STATION (FORDS). PHASE 1A.
Summary rept.
1 Apr 64, 186p.
Contract NBy37640
Unclassified report

Descriptors: (*Barges, Oceanographic equipment), (*Floats, Structures), (*Hoists, Feasibility studies), Supports, Piers, Transducers, Electric cables, Weight, Handling, Cables (Mechanical), Pipes, Wind, Hydrostatics, Motion, Ocean waves, Underwater sound, Costs, Tests.

The basic requirements for FORDS was to provide a stable platform for the testing of heavy pieces of equipment submerged below the surface of the ocean. It is desired that the platform conduct testing operations up to and including sea state 6 conditions and that it also be capable of survival of extremely severe storms at sea. The motion of the platform in the testing position was specified as the absolute motion with respect to the inertial reference of the earth must be small with respect to the maximum particle motion of ocean surface waves. This goal will be considered to be satisfied if the heaving motion of the FORDS is less than about five percent of the wave height for a wave whose period is equal to or less than ten seconds. (Author)

AD-438 854 Div. 31, 6
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
EXPERIMENTAL DETERMINATION OF PRESSURE AND STRAIN ON THE BOW SONAR DOME OF USS BARRY (DD 933),
by Louis A. Becker. Jul 60, 23p.
DTMB 1395 Unclassified report

Descriptors: (*Sonar domes, Stresses), Motion, Destroyers, Pressure, Tests, Strain (Mechanics), Measurement.

Measurements were made on the bow sonar dome of USS BARRY (DD 933) during full-scale trials to determine the pressure loadings on and structural response of the dome. These measurements are correlated with ship motions and sea states. The maximum stress measured in the dome structure was 13,500 psi, compression. The maximum pressure observed during the trials was 42 psi. Both the maximum pressure and the maximum stress occurred during a slam in a State 6 sea. In this sea condition acceleration at the bow reached ±1.1 g, and the pitch was as high as ±5 deg. From the measured strains in the hull, a maximum midships bending stress of 18,750 psi tension and a maximum quarterpoint shear stress of 3400 psi were determined. The measurements show the dome to be adequate to withstand the stresses resulting from all maneuvers conducted during the trials. (Author)

AD-439 207 Div. 31
OTS price $7.60

David Taylor Model Basin, Washington, D. C.
CALCULATED NORMAL MODES AND NATURAL FREQUENCIES OF NS SAVANNAH, INCLUDING SPRUNG MASS CONSIDERATION OF THE CONTAINMENT VESSEL,
by John T. Cummings. Mar 64, 80p.
DTMB 1787 Unclassified report

Descriptors: (*Merchant vessels, Nuclear powered vessels), (*Nuclear powered vessels, Merchant vessesl), (*Vibration, Nuclear powered vessels), cargo ships, Frequency, Mathematical analysis, Models (Simulations), Programming (Computers), Ship structural components, Deformation, Shear stresses, Springs, Machinery, Tables.

This study was undertaken to determine the effect of the containment vessel (including the nuclear reactor), which is a large concentrated mass, on the vibratory characteristics of NS SAVANNAH. The vertical vibration calculations for the containment vessel when rigidly attached and when spring attached to the hull are compared. From this comparison the conclusion is drawn that considering the containment vessel as attached to the hull with a spring constant equal to that of the mounting presently installed on the ship has little appreciable effect on the vibratory characteristics of SAVANNAH at low frequencies. Further calculations on the network analyzer using mountings with spring constants lower than the spring constant of the mounting presently installed on the ship indicate that a large mass such as the containment vessel can have considerable effect on the lower modes of vibration. A recommendation is made that such a network analyzer study be conducted during the design stage of any ship having a large concentrated mass. (Author)

AD-439 208 Div. 31
OTS price $3.60

David Taylor Model Basin, Washington, D. C.
HYDROSTATIC PRESSURE TESTS OF A RING-STIFFENED CYLINDER OF OVAL CROSS SECTION (MAJOR-TO-MINOR AXIS RATIO OF 1.5),
by William P. Couch. Mar 64, 36p.
Proj. S F013 03 02
DTMB 1788 Unclassified report

Descriptors: (*Stiffened cylinders, Submarine hulls), (*Submarine hulls, Stiffened cylinders), (*Ballistic missile submarines, Stiffened cylinders), Rings, Hydrostatic pressure, Model tests, Stresses, Structural shells, Pressure vessels, Failure (Mechanics).

Test results of a ring-stiffened oval cylinder indicate that the use of the local radius of curvature and dimensions of the oval cylinder in a solution for a ring-stiffened circular cylinder will not yield good predictions for the deformations and stresses. Based on the collapse strength of the models tested, it appears that an oval cylinder designed for deep-depth operation is a very inefficient structure compared to a circular ring-stiffened cylinder of the same weight-displacement ratio. The critical stresses were found to be much higher for the ring-stiffened oval cylinder tested, than for those of an equivalent circular cylinder based on the same radius of curvature. It was also found that tubes or struts placed parallel to the minor axis of the oval cross section appreciably reduced the magnitude of the critical stresses. (Author)

AD-439 291 Div. 31
OTS price $8.60

Marine Engineering Lab., Annapolis, Md.
GUIDE FOR STRUCTUREBORNE MACHINERY NOISE MEASUREMENTS,
by David L. Whalen. 1 May 64, 95p.
Unclassified report

Descriptors: (*Machines, Noise), (*Noise, Measurement), Instrumentation, Transducers, Calibration, Magnetic tape, Recording systems, Analysis, Amplifiers, Corrections, Vibration, Frequency, Errors, Experimental data, Accelerometers.

This guide presents the necessary information required to make machinery noise measurements with a high degree of confidence. Airborne noise measurements will not be included, since

33. TRANSPORTATION

AD-438 146 Div. 33
OTS price $1.50

California U., Los Angeles.
TECHNICAL STUDIES IN TRANSPORTATION: TRANSPORTATION COST FINDING,
by Richard N. Farmer. Dec 63, 52p. Rept. no. 63 65
Contract Nonr23307
Unclassified report

Descriptors: (*Transportation, Economics), (*Costs, Models (Simulations)), Feasibility studies, Test methods, Cargo, Operation, Analysis, Time, Design.

AD-438 174 Div. 33, 19
OTS price $10.50

Radio Corp. of America, Burlington, Mass.
INVESTIGATION IN DESIGN OF MAINTENANCE FACILITY FOR AN/TSQ-47,
by James J. Lauginiger, Gerald E. Surette and Herbert W. Varley. Jan 64, 137p.
Contract AF19 628 490
ESD TDR64 198 Unclassified report

Descriptors: (*Air traffic control systems, Maintenance), Radar antennas, Communication systems, Radar, Analysis, Maintainability, Reliability, Tests, Navigation, Guidance.

This report analyzes and discusses reliability, maintainability and AGE reports in anticipation of assuring adequate support for an extended deployment from 30 days to 90 days. It analyzes the current available test data to complement the maintenance facility with additional test equipment and/or spare parts to produce a more effective maintenance facility for the system. The AN/TPS-35 and AN/TPN-14 subsystems and the associated microwave links are investigated for feasible auto-test monitoring. (Author)

AD-438 235 Div. 33, 1, 30
OTS price $6.40

Merz Division-Merz Chambers Corp., Indianapolis, Ind.
INSTRUCTION MANUAL FOR FLIGHT PROGRESS STRIP LOADER TYPE II.
Nov 63, 64p.
Unclassified report

Descriptors: (*Air control centers, Data processing systems), (*Data processing systems, Instruction manuals), Display systems, Instrumentation, Air traffic control systems, Air traffic, Automation, Operation, Safety, Configuration, Clutches, Safety, Processing, Nylon.

This instruction book contains the complete operation and service instruction for the Flight Progress Strip Loader, Type II. The Flight Progress Strip Loader is, part of a Data Processing and Display System, which will provide for partial automation of the Air Traffic Control function. The specific requirement of this machine is to individually load printed Flight Progress Strips, Type FAA-561-X1, into nylon Strip Holders, Type FAA-B-4497-E and deliver the loaded holder to a delivery rack. The strips are manually carried from the printer and inserted into the machine strip feed opening. After the machine had performed the loading operation, the loaded holders are manually distributed for use on Flight Progress Boards in the Air Route Traffic Control Center for control of air traffic. (Author)

AD-438 915 Div. 33, 28
OTS price $8.10

Pittsburgh U., Pa.
REGRESSION: AN ANALYTICAL AID FOR THE ADMISSION OF MASTER'S DEGREE CANDIDATES,
by Harry Wayne Larabee. 1964, 85p.
Unclassified report

Descriptors: (*Personality, Analysis), (*Education, Operations research), Achievement tests, Aptitude tests, Students, Classification, Selection, Tables, Mathematical analysis, Leadership.

Master's thesis.

Descriptors: (*Indonesia, Military government).

This study is an attempt to widen the knowledge in this area and to stimulate further research in regard to the militaries of the underdeveloped areas. The author has attempted to analyze the performance of the army in Indonesia, its past role and possible future role. (Author)

AD-439 204 Div. 32
OTS price $10.10

Electromagnetic Compatibility Analysis Center, Annapolis, Md.
ECAC THESAURUS OF KEYWORDS,
by R. A. Lambert, J. E. Farrell and D. L. Flynn.
1st ed. Sep 63, 123p. TM X042A1
Unclassified report

Descriptors: (*Vocabulary, Radio interference), (*Electronics, Indexes), (*Subject indexing, Electronics), Engineering, Frequency, Mathematical models, Computers, Radiofrequency, Radiofrequency interference, Radar interference.

This thesaurus is the first edition in a continuing effort to provide coordinate-indexing access to literature in the fields of radio frequency interference (RFI), computer applications and mathematical modeling. This edition is strongest in RFI, but weak in the latter two areas. The thesaurus is divided into three sections: alphabetical list of keywords, equipment by AN/ number, and equipment by various military and commercial designations. (Author)

AD-439 234 Div. 32, 15
OTS price $5.60

California Univ., Berkeley, Center for Research in Management Science.
DYNAMIC PROGRAMMING OF ECONOMIC GROWTH,
by Roy Radner. Feb 64, 54p. Rept. no. TR17
Contract Nonr22277, Proj. NR047 029
Unclassified report

Descriptors: (*Economics, Dynamic programming), Growth, Mathematical models, Theory, Equations, Theorems, Mathematical analysis.

A class of problems of optimal economic growth is formulated in terms of the functional equation approach of dynamic programming (Bellman, 1957). A study is made of the continuity and concavity properties of the state valuation function, i.e., the function indicating the maximum total discounted welfare (utility) that can be achieved starting from a given initial state of the economy. Under suitable conditions this function is characterized by a certain functional equation. Both the cases of a finite and an infinite planning horizon are treated, the latter case being discussed under the assumption of constant technology and tastes. Here iteration of a certain transformation associated with the functional equation is shown to provide convergence to the state valuation function. Exact solutions are given for the case of linear-logrithmic production and welfare functions. (Author)

AD-439 235 Div. 32, 30, 26
OTS price $5.60

California Univ., Berkeley.
OPTIMAL GROWTH IN A LINEAR-LOGARITHMIC ECONOMY
by Roy Radner. Apr 64, 58p. Technical rept. no. 18
Contract Nonr22277, Proj. NR047 029
Unclassified report

Descriptors: (*Economics, Optimization), Mathematical models, Set theory, Dynamic programming, Linear systems, Production, Costs, Management planning.

The goal of this study of optimal growth in a linear-logarithmic economy has been to provide an example of a multi-sector model of economic growth in which optimal programs can be explicitly calculated for several different formulations of the criterion of optimality. With such explicit calculations one can illustrate various propositions, and test conjectures, about the properties of optimal growth. If the model studied here turns out to be sufficiently flexible, the relative simplicity of the required calculations may also make the model attractive for empirical applications. (Author)

AD-439 340 Div. 32, 20
OTS price $3.60

Radiation Effects Information Center, Columbus, Ohio.
ABSTRACT NO. 23419 TO 23508. PART I.
Monthly accession list, 1-30 Apr 64.
10 May 64, 35p. Rept. no. AL 74
Contract AF33 615 1124
Unclassified report

Descriptors: (*Abstracts, Radiation effects), (*Radiation effects, Abstracts), (*Indexes, Radiation effects), Materials, Metals, Ceramic materials, Polymers, Inorganic compounds, Electronics, Space environmental conditions.

AD-439 355 Div. 32, 20
OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST, COORDINATE INDEX, PART II. ACCESSION LISTS FROM OCTOBER 1, 1963 TO APRIL 30 1964.
10 May 64, 23p.
Unclassified report

Descriptors: (*Radiation effects, Indexes), (*Indexes, Radiation effects), Sources, Materials, Radiation measurement systems, Mechanical properties, Gamma rays, Electrons, Fast neutrons, Nuclear particles, Positrons, Protons, Ultraviolet radiation, Helium, Deuterons, Alpha particles, Electromagnetic waves, Thermal neutrons.

AD-439 373 Div. 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
INCENTIVES AND R&D CONTRACTING,
by Thomas K. Glennan, Jr. Mar 64, 15p. Rept. no. P2887
Unclassified report

Presented at the Second Semi-annual AFSC Research and Technology Division Procurement Management Seminar, 18-20 Mar 64, Santa Monica, California.

Descriptors: (*Research program administration, Procurement), (*Procurement, Personnel), Management engineering, Scheduling, Department of Defense.

SUBJECT INDEX

SUBJECT INDEX

ABSTRACTS
MATERIALS
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
AD-439 980 DIV. 14

ABSTRACTS
RADIATION EFFECTS
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS,
AD-438 540 DIV. 16
ABSTRACT NO. 23419 TO 23508, PART I,
AD-439 340 DIV. 32
ABSTRACTS OF USAPRO RESEARCH PUBLICATIONS--FY 1963,
AD-438 846 DIV. 30
ABSTRACTS OF PROJECTS ON PROPELLANT ACTUATED DEVICES FOR THE U.S. AIR FORCE,
AD-439 662 DIV. 12

ABSTRACTS
UPPER ATMOSPHERE
PHENOMENA IN THE UPPER ATMOSPHERE, COMPILATION OF ABSTRACTS FROM SOVIET LITERATURE,
AD-439 227 DIV. 2

ACCELERATION
RANGE FINDING
GRAVITATIONAL SMOOTHING,
AD-437 999 DIV. 18

ACCELERATION TOLERANCE
ELECTROENCEPHALOGRAPHY
ELECTROENCEPHALOGRAPHIC CHANGES IN HUMAN SUBJECTS DURING BLACKOUT PRODUCED BY POSITIVE ACCELERATION,
AD-438 483 DIV. 16

ACCELEROMETERS
PERFORMANCE (ENGINEERING)
MIAD ACCELOSWITCH AND ACCELEROMETER
AD-439 689 DIV. 22

ACOUSTIC INSULATION
METAL PLATES
SUITABILITY OF MIL-P-23653 MATERIAL FOR DAMPING MECHANICAL VIBRATIONS IN LIGHT STEEL PLATING,
AD-439 491 DIV. 14

ADAPTIVE CONTROL SYSTEMS
DELAY LINES
SELECTION OF A DELAY LINE MODEL,
AD-438 258 DIV. 24

ADHESIVES
SANDWICH PANELS
CREEP RUPTURE TESTS OF AEROBOND 500 AND DYNABOND 132 ADHESIVES,
AD-438 141 DIV. 14
MATERIAL -ADHESIVE -DYNABOND 132 -ADDITIONAL TESTING AND DISPOSITION OF SPECIMENS REMAINING FROM 420 F CREEP TEST (50-2895),
AD-438 781 DIV. 14

ADSORPTION
LOW-TEMPERATURE RESEARCH
CAPTURE COEFFICIENTS OF GASES AT 77 K,
AD-438 484 DIV. 25

AERIAL RECONNAISSANCE
PHOTOGRAPHIC PROCESSING EQUIPMENT
DENSITY DISCRIMINATION FOR PRINTER UTILIZATION STUDY,
AD-438 418 DIV. 24

AERODYNAMIC CHARACTERISTICS
DATA PROCESSING SYSTEMS
AERODYNAMIC INFLUENCE COEFFICIENTS FROM INCOMPRESSIBLE STRIP THEORY; ANALYTICAL DEVELOPMENT AND COMPUTATIONAL PROCEDURE,
AD-438 171 DIV. 9

AEROELASTICITY
AIRFOILS
AN INVESTIGATION OF THE FORCES ON AN AIRFOIL OSCILLATING IN PITCH ABOUT THE QUARTER CHORD,
AD-438 890 DIV. 9

AERONAUTICS
TRAINING
SEPARATION OF AVIATION OFFICER CANDIDATES FROM CADETS FOR PURPOSES OF PREDICTING VOLUNTARY WITHDRAWALS,
AD-438 639 DIV. 28

AEROSOLS
PARTICLE SIZE
PARTICLE-SIZE DETERMINATION OF AEROSOLS BY THE PHOTOEXTINCTION TECHNIQUE,
AD-438 233 DIV. 25

AEROSOLS
PHYSICAL PROPERTIES
STUDIES IN THE PHYSICS OF ROUGHLY DISPERSED AEROSOLS,
AD-439 010 DIV. 25

AEROSPACE CRAFT
MATERIALS
INFORMATION REQUIREMENTS FOR APPLICATION OF NON-METALLIC STRUCTURAL MATERIALS TO AEROSPACE VEHICLES,
AD-439 427 DIV. 14
INTERACTION OF ONE-DIMENSIONAL SHOCKS FOR EQUILIBRIUM AIR,
AD-439 587 DIV. 22

AIR
THERMODYNAMICS
THE THERMODYNAMIC PROPERTIES OF AIR IN DISSOCIATION AND IONIZATION EQUILIBRIUM FROM 500 K TO 25,000 K,
AD-438 260 DIV. 2

AIR CONTROL CENTERS
DATA PROCESSING SYSTEMS
INSTRUCTION MANUAL FOR FLIGHT PROGRESS STRIP LOADER TYPE II,
AD-438 235 DIV. 33

AIR DROP OPERATIONS
IMPACT SHOCK
QUALITATIVE EVALUATION OF THE AIRDROP IMPACT CAPABILITY OF THE M44 INCAPACITATING CLUSTER,
AD-438 014 DIV. 22

AIR FORCE PERSONNEL
INTELLIGENCE TESTS
COMPARISON OF TEST ITEMS ACROSS FORMS,
AD-437 953 DIV. 28

AIR MASS ANALYSIS
PERIODIC VARIATIONS
STATISTICAL-DYNAMICAL METEOROLOGICAL PREDICTIONS,
AD-439 950 DIV. 2

AIR TRAFFIC CONTROL SYSTEMS
MAINTENANCE
INVESTIGATION IN DESIGN OF MAINTENANCE FACILITY FOR AN/TSQ-47,
AD-438 174 DIV. 33

AIRCRAFT
NON DESTRUCTIVE TESTING
INVESTIGATION OF EDDY CURRENT TECHNIQUES IN ANALYZING AIRCRAFT STRUCTURES FOR FATIGUE DAMAGE,
AD-438 893 DIV. 28

AIRCRAFT
SCHEDULING
A STOCHASTIC MODEL FOR DISPATCHING GROUND SUPPORT AIRCRAFT,
AD-438 833 DIV. 18

AIRCRAFT GUNS
ELECTRIC GUNS
PROJECT VULCAN RESEARCH AND DEVELOPMENT,
AD-439 356 DIV. 22

AIRCRAFT INTERCEPT CONTROL SYSTEMS
RELIABILITY
AIR WEAPONS CONTROL SYSTEM 412L,
AD-439 405 DIV. 6

AIRFOILS
OSCILLATION
AN INVESTIGATION OF THE FORCES ON AN AIRFOIL OSCILLATING IN PITCH ABOUT THE QUARTER CHORD,
AD-438 890 DIV. 9

AIRFOILS
SUBSONIC CHARACTERISTICS
AERODYNAMIC INFLUENCE COEFFICIENTS FROM INCOMPRESSIBLE STRIP THEORY; ANALYTICAL DEVELOPMENT AND COMPUTATIONAL PROCEDURE,
AD-438 171 DIV. 9

AIRFRAME BEARINGS
DESIGN
INVESTIGATION OF SELF-ALIGNING BEARING MOUNTINGS FOR SPACE OPERATION,
AD-439 857 DIV. 24

AIRFRAMES
RADOMES
FABRICATION OF A LIGHTWEIGHT PLASTIC MISSILE RADOME,
AD-439 224 DIV. 8

AIRPLANE ENGINES
IGNITION SYSTEMS
EVALUATION OF THE BREAKERLESS HIGH-FREQUENCY IGNITION SYSTEM IN THE R-1820-82A MODEL ENGINE INSYALLED IN THE S-2D AIRPLANE,
AD-439 334 DIV. 27

AIRPLANE NOISE
BOUNDARY LAYER TRANSITIONS
IN-FLIGHT NOISE MEASUREMENTS PERFORMED ON THE X21A LAMINAR FLOW AIRCRAFT,
AD-439 351 DIV. 1

AIRPLANE PANELS
THERMAL INSULATION
"K" FACTOR DETERMINATION OF FOUR TYPES OF PANEL CONSTRUCTION IN F-111 AIRPLANE,
AD-438 470 DIV. 14

ALASKA
CLIMATOLOGY
ENVIRONMENT AND DISTRIBUTION OF THERMAL RELIEF FEATURES IN THE NORTHERN FOOTHILLS SECTION, ALASKA,
AD-438 135 DIV. 2

ALASKA
OCEAN BOTTOM SAMPLING
STUDY OF NEAR-SHORE BOTTOM PROFILES EAST AND SOUTHWEST OF POINT BARROW, ALASKA; COMPARISON OF PROFILES AND THE BARRIER ISLANDS IN THE POINT LAY AND PLOVER ISLANDS AREAS,
AD-438 463 DIV. 2

ALGAE
CHEMICAL ANALYSIS
CHEMICAL COMPOSITION AND APPLICABILITY AS FOOD AND FEED OF MASS-CULTURED UNICELLULAR ALGAE,
AD-438 656 DIV. 16

ALGAE
FOOD
CHEMICAL COMPOSITION AND APPLICABILITY AS FOOD AND FEED OF MASS-CULTURED UNICELLULAR ALGAE,
AD-438 658 DIV. 16

ALGEBRAIC TOPOLOGY
TRANSFORMATIONS (MATHEMATICS)
APPLICATION OF SPINOR METHODS TO RIEMANNIAN MANIFOLDS,
AD-439 076 DIV. 18

ALKALINE CELLS
TESTS
TESTING AND EVALUATION OF PRIMARY ALKALINE CELLS AND BATTERIES,
AD-439 454 DIV. 7

ALUMINUM
NEUTRON FLUX
NEUTRON REFLECTION AND FLUX VERSUS DEPTH FOR ALUMINUM WITH AN APPENDIX NEUTRON DOSE TRANSMISSION VERSUS THICKNESS,
AD-439 441 DIV. 20
INVESTIGATION OF EDDY CURRENT TECHNIQUES IN ANALYZING AIRCRAFT STRUCTURES FOR FATIGUE DAMAGE,
AD-438 893 DIV. 28

ALUMINUM ALLOYS
MECHANICAL PROPERTIES
REST REACTIONS IN INTERMETALLIC COMPOUNDS, II, INVESTIGATIONS ON NIAL, AND TWO MOSI2 STRUCTURES,
AD-439 216 DIV. 17

ALUMINUM COMPOUNDS
HYDRIDES
UNCLASSIFIED ANNOTATED BIBLIOGRAPHY RELATING TO THE SYNTHESIS AND PHYSICAL PROPERTIES OF ALUMINUM HYDRIDE AND CLOSELY RELATED COMPOUNDS,
AD-439 243 DIV. 4

AMINES
PHENOLS
DISTRIBUTION OF BIOLOGICALLY ACTIVE COMPOUNDS IN THE BODY,
AD-438 395 DIV. 16

AMMONIA
PHOTOLYSIS
FLASH PHOTOLYSIS AND FLUORESCENCE OF NH3 IN THE VACUUM ULTRAVIOLET,
AD-438 411 DIV. 4
PHOTOLYSIS OF AMMONIA IN THE FAR ULTRAVIOLET,
AD-438 499 DIV. 4

AMPUTATION STUMPS
BLOOD CIRCULATION
EXPERIMENTAL SURGERY ON RESUSCITATION OF AMPUTATED OR NEARLY AMPUTATED LEG,
AD-438 748 DIV. 16

AMPUTATION STUMPS
METABOLISM
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG,
AD-439 023 DIV. 16
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG,
AD-439 024 DIV. 16

ANTENNA SIMULATORS
MEASUREMENT
RE-ENTRY PROPAGATION AND ANTENNA STUDIES,
AD-438 963 DIV. 8

ANTENNAS
COMMUNICATION SYSTEMS
THE WEST FORD ANTENNA SYSTEM,
AD-438 879 DIV. 8

ANTENNAS
GUIDED MISSILE TRACKING SYSTEMS
STUDY OF ANTENNA AXIS CONFIGURATION

AD-438 812 DIV. 31
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH AND DEVELOPMENT STATION (FORDS). VOLUME III,
AD-438 813 DIV. 31
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH AND DEVELOPMENT STATION (FORDS). PHASE 1A,
AD-438 814 DIV. 31

BARNACLES
COLLECTING METHODS
OBSERVATIONS ON THE CIRRAL ACTIVITY OF CERTAIN SPECIES OF SESSILE BARNACLES (CIRRIPEDIA) ON THE COASTS OF NORTH AMERICA, WITH INVESTIGATIONS ON THE PHYSIOLOGY OF SHALLOW WATER POGONOPHORA OF THE ARCTIC OCEAN,
AD-438 884 DIV. 16

BASE FLOW
SLENDER BODIES
TURBULENT BASE FLOW BEHIND A SLENDER SUPERSONIC RE-ENTRY VEHICLE,
AD-439 219 DIV. 9

BATTERIES + COMPONENTS
PRIMARY CELLS
TESTING AND EVALUATION OF PRIMARY ALKALINE CELLS AND BATTERIES,
AD-439 454 DIV. 7

BATTERIES + COMPONENTS
STORAGE BATTERIES
LITHIUM-SILVER CHLORIDE SECONDARY BATTERY INVESTIGATION,
AD-439 399 DIV. 7

BATTERY SEPARATORS
CELLULOSIC PLASTICS
CHARACTERIZATION OF CELLOPHANE AS AN IONIC BARRIER,
AD-437 997 DIV. 14

BEACONS
SATELLITES (ARTIFICIAL)
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE,
AD-438 872 DIV. 12
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE,
AD-438 873 DIV. 12
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE,
AD-438 874 DIV. 12

BEARINGS
MOUNTING BRACKETS
INVESTIGATION OF SELF-ALIGNING BEARING MOUNTINGS FOR SPACE OPERATION,
AD-439 857 DIV. 24

BEHAVIOR
ANALYSIS
MECHANISMS OF INTEGRATION OF PATTERNS OF BEHAVIOR: A. STUDY OF THE DEVELOPMENT AND INTEGRATION OF NEST BUILDING SKILLS IN CANARIES. B. CHANGES IN RESPONSIVENESS UNDER CONSTANT OR REPETITIVE STIMULATION. C. THE EFFECT OF AUDITORY DEPRIVATION OF BEHAVIOUR,
AD-438 238 DIV. 28

BERYLLIUM
BIBLIOGRAPHIES
BERYLLIUM: AN ANNOTATED BIBLIOGRAPHY OCTOBER DECEMBER 1962, SUPPLEMENT III,
AD-438 176 DIV. 17

BERYLLIUM
CHEMICAL ANALYSIS
DEVELOPMENT OF ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF MINUTE QUANTITIES OF SELECTED ELEMENTS IN BERYLLIUM,
AD-439 727 DIV. 4

BERYLLIUM
MECHANICAL PROPERTIES
EVALUATION OF FINE, ANODIZED BERYLLIUM WIRE,
AD-439 085 DIV. 17

BERYLLIUM
PANELS (STRUCTURAL)
SHEAR TEST OF CHEMICAL MILLED BERYLLIUM WAFFLE PANEL,
AD-438 138 DIV. 17

BERYLLIUM
THERMODYNAMICS
THERMODYNAMICS OF REFRACTORY COMPOUNDS OF BERYLLIUM (OXIDES, BORIDES, CARBIDES, AND NITRIDES): AN ANNOTATED BIBLIOGRAPHY,
AD-439 445 DIV. 14

BERYLLIUM
WIRE
STUDY OF SIZE EFFECT IN FINE BERYLLIUM WIRE PHASE II
AD-438 478 DIV. 17
DEVELOPMENT OF VERY HIGH STRENGTH BERYLLIUM WIRE,
AD-439 498 DIV. 24

BERYLLIUM COMPOUNDS
THERMODYNAMICS
THERMODYNAMICS OF REFRACTORY COMPOUNDS OF BERYLLIUM (OXIDES, BORIDES, CARBIDES, AND NITRIDES): AN ANNOTATED BIBLIOGRAPHY,
AD-439 445 DIV. 14

BIBLIOGRAPHIES
ABSTRACTING
SKY ILLUMINATION DURING ECLIPSE, ANNOTATED BIBLIOGRAPHY OF SOVIET-BLOC LITERATURE FOR THE PERIOD 1940-1963,
AD-439 226 DIV. 2

BIBLIOGRAPHIES
ALUMINUM COMPOUNDS
UNCLASSIFIED ANNOTATED BIBLIOGRAPHY RELATING TO THE SYNTHESIS AND PHYSICAL PROPERTIES OF ALUMINUM HYDRIDE AND CLOSELY RELATED COMPOUNDS,
AD-439 243 DIV. 4

BIBLIOGRAPHIES
BERYLLIUM
BERYLLIUM: AN ANNOTATED BIBLIOGRAPHY OCTOBER DECEMBER 1962, SUPPLEMENT III,
AD-438 176 DIV. 17

BIBLIOGRAPHIES
ELECTRONICS
THE DESIGN AND ANALYSIS OF ELECTRICAL ELECTRONIC SYSTEMS BY MEANS OF DIGITAL COMPUTERS: AN ANNOTATED BIBLIOGRAPHY,
AD-439 440 DIV. 8

BIBLIOGRAPHIES
METAL FILMS
NICKEL-IRON PERMALLOY FILMS: AN ANNOTATED BIBLIOGRAPHY,
AD-439 443 DIV. 17

BIBLIOGRAPHIES
PERFORMANCE TESTS
BIBLIOGRAPHY ON MAINTENANCE PERSONNEL PERFORMANCE MEASUREMENT,
AD-439 610 DIV. 28

BIBLIOGRAPHIES
RADIATION EFFECTS
RADIATION EFFECTS UPON EXPERIMENTAL ANIMALS, MAN, AND PLANTS: AN ANNOTATED BIBLIOGRAPHY, VOL II, M-Z,
AD-438 177 DIV. 32
RADIATION EFFECTS UPON EXPERIMENTAL ANIMALS, MAN, AND PLANTS: AN ANNOTATED BIBLIOGRAPHY, VOL. I, A-L,
AD-438 178 DIV. 32

BIBLIOGRAPHIES
REPORTS
BIBLIOGRAPHY OF REPORTS,
AD-438 720 DIV. 12

BIBLIOGRAPHIES
TELEMETER SYSTEMS
PCM TELEMETRY: AN ANNOTATED BIBLIOGRAPHY,
AD-439 442 DIV. 5

BIOCHEMISTRY
GENETICS
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM,
AD-439 296 DIV. 16
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM,
AD-439 298 DIV. 16

BIOCHEMISTRY
RADIOPROTECTIVE AGENTS
A QUARTERLY PROGRESS REPORT ON THE EFFECTS OF IONIZING RADIATION, PROTECTIVE OR THERAPEUTIC COMPOUNDS AND EFFECTS OF LOW LEVELS OF GAMMA AND FAST NEUTRON EXPOSURE,
AD-438 895 DIV. 16

BIRDS
BEHAVIOR
MECHANISMS OF INTEGRATION OF PATTERNS OF BEHAVIOR: A. STUDY OF THE DEVELOPMENT AND INTEGRATION OF NEST BUILDING SKILLS IN CANARIES. B. CHANGES IN RESPONSIVENESS UNDER CONSTANT OR REPETITIVE STIMULATION. C. THE EFFECT OF AUDITORY DEPRIVATION OF BEHAVIOUR,
AD-438 238 DIV. 28

BLOOD CIRCULATION
AMPUTATION STUMPS
EXPERIMENTAL SURGERY ON RESUSCITATION OF AMPUTATED OR NEARLY AMPUTATED LEG,
AD-438 748 DIV. 16

BLOWERS
EXHAUST SYSTEMS
COPES-VULCAN DIVISION BLAW-KNOX COMPANY MODEL D-4 ROTARY SOOT BLOWER HEAD,
AD-437 991 DIV. 13

BLUNT BODIES
GAS FLOW
A METHOD OF DETERMINING FLOW FIELDS OF BLUNT NOSED SLENDER BODIES AT ARBITRARY ANGLES OF YAW,
AD-439 008 DIV. 9

BLUNT BODIES
HYPERSONIC CHARACTERISTICS
THE INVISCID FLOW OF REACTING AND RADIANT AIR PAST A HYPERSONIC BLUNT BODY,
AD-438 261 DIV. 9

BODIES OF REVOLUTION
AXIALLY SYMMETRIC FLOW
ASYMMETRIC INVISCID MODES OF INSTABILITY FOR SPIRAL FLOW BETWEEN TWO CONCENTRIC ROTATING CYLINDERS,
AD-439 326 DIV. 9

BODY FLUIDS
PHYSICAL PROPERTIES
THERMAL AND ELECTRICAL CONDUCTIVITIES OF BIOLOGICAL FLUIDS AND TISSUES,
AD-438 144 DIV. 16

BOILERS
BLOWERS
COPES-VULCAN DIVISION BLAW-KNOX COMPANY MODEL D-4 ROTARY SOOT BLOWER HEAD,
AD-437 991 DIV. 13

BOMB CLUSTERS
AIR DROP OPERATIONS
QUALITATIVE EVALUATION OF THE AIRDROP IMPACT CAPABILITY OF THE M44 INCAPACITATING CLUSTER,
AD-438 014 DIV. 22

BONDING
SANDWICH PANELS
CREEP RUPTURE TESTS OF AEROBOND 500 AND DYNABOND 132 ADHESIVES,
AD-438 141 DIV. 14

BOUNDARY LAYER CONTROL SYSTEMS
WING SLOTS
LAMINAR FLOW CONTROL DEMONSTRATION PROGRAM, LFC MANUFACTURING TECHNIQUES,
AD-439 329 DIV. 24

BOUNDARY LAYER TRANSITIONS
AIRPLANE NOISE
IN-FLIGHT NOISE MEASUREMENTS PERFORMED ON THE X21A LAMINAR FLOW AIRCRAFT,
AD-439 351 DIV. 1

BOUNDARY VALUE PROBLEM
ELASTICITY
NUMERICAL TREATMENT OF AN INTEGRAL EQUATION ARISING IN A MIXED-BOUNDARY ELASTICITY PROBLEM,
AD-437 920 DIV. 15

BRAIN
AUTONOMIC NERVOUS SYSTEM
RESEARCH ON BRAIN STEM MECHANISMS REGULATING AUTONOMIC ACTIVITIES,
AD-438 640 DIV. 16

BRAIN
DISEASES
EXPERIMENTAL STUDIES OF THE EFFECT OF CALCIUM DEFICIENT DIET TO THE ARTERIAL WALL AND OTHER TISSUES WITH SPECIAL REFERENCE TO CEREBROVASCULAR DISEASES,
AD-439 308 DIV. 16

BRAZING
PIPES
APPLIED RESEARCH AND DEVELOPMENT WORK ON FAMILIES OF BRAZED AND WELDED FITTINGS FOR ROCKET PROPULSION FLUID SYSTEMS,
AD-438 225 DIV. 27

BROMINE COMPOUNDS
CHEMICAL REACTIONS
BRIEF DISCUSSION OF RESEARCH IN FLUORINE CHEMISTRY,
AD-439 658 DIV. 4

BUBBLE CHAMBERS
PHOTOGRAPHIC RECORDING SYSTEMS
ON THE PROBLEM OF STEREOSCOPY IN THE BUBBLE CHAMBER. CORRECTION OF REFRACTION
AD-437 954 DIV. 24

CABLES (MECHANICAL)
FLUID MECHANICS
A FORTRAN PROGRAM FOR THE CALCULATION OF THE EQUILIBRIUM CONFIGURATION OF A FLEXIBLE CABLE IN A UNIFORM STREAM,
AD-438 421 DIV. 9

CADMIUM COMPOUNDS
TELLURIDES
RESEARCH ON THIN FILM POLYCRYSTALLINE SOLAR CELLS,
AD-438 526 DIV. 7

CALCIUM
DIET
EXPERIMENTAL STUDIES OF THE EFFECT OF CALCIUM DEFICIENT DIET TO THE ARTERIAL WALL AND OTHER TISSUES WITH SPECIAL REFERENCE TO CEREBROVASCULAR DISEASES,
AD-439 308 DIV. 16

CALCULUS OF VARIATIONS
TRAJECTORIES
A STUDY OF OPTIMIZATION TECHNIQUES,
AD-438 980 DIV. 19

CAPACITORS
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE

FOR SATELLITE TRACKING AND CONTINUED STUDY OF TRANSPORTABLE ANTENNA SYSTEMS.
AD-439 280 DIV. 8

ANTENNAS
PLASMA MEDIUM
EFFECTS OF RE-ENTRY PLASMA SHEATH ON ANTENNA CHARACTERISTICS.
AD-438 964 DIV. 8

ANTENNAS
RADIOFREQUENCY INTERFERENCE
DERIVATION OF AEROSPACE ANTENNA COUPLING-FACTOR INTERFERENCE PREDICTION TECHNIQUES.
AD-438 208 DIV. 8

ANTENNAS
SCIENTIFIC RESEARCH
RESEARCH STUDIES ON PROBLEMS RELATED TO ANTENNAS.
AD-439 528 DIV. 8

ANTENNAS
SIMULATION
RE-ENTRY PROPAGATION AND ANTENNA STUDIES.
AD-438 963 DIV. 8

ANTENNAS
SPACE PROBES
FLUSH AND NONFLUSH MOUNTED TELEMETRY ANTENNAS FLUSH MOUNTED COMMAND CONTROL ANTENNAS S-BAND AND C-BAND BEACON TRANSPONDER ANTENNAS ANTENNA SYSTEMS FOR SPECIFIC MISSILES, PROBES AND SATELLITES.
AD-439 629 DIV. 8

ANTIBIOTICS
BIOCHEMISTRY
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
AD-439 310 DIV. 16

ANTIBIOTICS
EFFECTIVENESS
ANTIBIOTICS FOR EUBACTERIALES.
AD-438 468 DIV. 16

ANTIBIOTICS
METABOLISM
STUDIES ON THE MODE OF ACTION OR ANTIBACTERIAL DRUGS
AD-438 544 DIV. 16

ANTIBIOTICS
MOLECULAR STRUCTURE
EXPLORATION OF NEW CHEMOTHERAPEUTI FOR INFECTIOUS DISEASES.
AD-439 314 DIV. 4
EXPLORATION OF NEW CHEMOTHERAPEUTI FOR INFECTIOUS DISEASES.
AD-439 315 DIV. 4
EXPLORATION OF NEW CHEMOTHERAPEUTIC FOR INFECTIOUS DISEASES.
AD-439 316 DIV. 16

ANTIOBIOTICS
MORPHOLOGY (BIOLOGY)
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
AD-438 543 DIV. 16

ANTIBIOTICS
STAPHYLOCOCCUS
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
AD-439 311 DIV. 16

ANTIBIOTICS
STAPHYLOCOCCUS AUREUS
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
AD-439 313 DIV. 16

ANTIFRICTION BEARINGS
MOUNTING BRACKETS
INVESTIGATION OF SELF-ALIGNING BEARING MOUNTINGS FOR SPACE OPERATION.
AD-439 856 DIV. 24

ANTIGENS + ANTIBODIES
SHIGELLA FLEXNERI
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS).
AD-438 745 DIV. 16

ANTIRAIN AGENTS
PLASTIC COATINGS
THE DEVELOPMENT AND EVALUATION OF HEAT-RESISTANT, RAIN-EROSION-RESISTANT COATINGS.
AD-439 492 DIV. 14

ANTISUBMARINE AIRCRAFT
IGNITION SYSTEMS
EVALUATION OF THE BREAKERLESS HIGH-FREQUENCY IGNITION SYSTEM IN THE R-1820-82A MODEL ENGINE INSTALLED IN THE S-2D AIRPLANE.
AD-439 334 DIV. 27

ARMING DEVICES
PROJECTILES
ANALYSIS AND DESIGN ROTARY-TYPE SETBACK LEAF S+A MECHANISMS.
AD-439 337 DIV. 22

ARMY EQUIPMENT
SPECIFICATIONS
REFERENCE MANUAL ON TENTAGE.
AD-438 008 DIV. 29

ARTHROPODS
BIBLIOGRAPHIES
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE, VOLUME III, NO. 5.
AD-437 929 DIV. 16

ARTIFICIAL INTELLIGENCE
OPTIMIZATION
AN ANALYSIS OF AN APPROXIMATE SEQUENTIAL PROCEDURE FOR INTERVAL ESTIMATION.
AD-438 559 DIV. 30

ASTROPHYSICS
ABSORPTION SPECTRUM
TEMPERATURE MEASUREMENTS FOR SHOCK HEATED POWDERED SOLIDS.
AD-438 259 DIV. 25

ASTROPHYSICS
SCIENTIFIC RESEARCH
COSMIC RESEARCH (KOSMICHESKIYE ISSLEDOVANIYA).
AD-439 330 DIV. 2

ATMOSPHERE
INFRARED RADIATION
DETERMINATION OF SMOOTH DISTRIBUTION OF ATMOSPHERIC OZONE FROM THE ABSORPTION AND EMISSION OF THE 9.6 MICRONS BAND.
AD-438 413 DIV. 2

ATMOSPHERE
OZONE
RESULTS OF OBSERVATIONS ON ATMOSPHERIC OZONE BY THE INFRARED METHOD, DEDUCED FROM DATA OBTAINED IN AROSA (SWITZERLAND).
AD-439 212 DIV. 2

ATMOSPHERE
RECOMBINATION REACTIONS
THEORETICAL CALCULATION OF CROSS-SECTIONS OF IMPORTANCE TO ATMOSPHERIC DEIONIZATION.
AD-439 429 DIV. 25

ATMOSPHERE MODELS
CLOUDS
FORBIDDEN REGIONS FOR THE FORMATION OF CLOUDS IN FORMATION OF CLOUDS IN A PLANETARY ATMOSPHERE.
AD-438 216 DIV. 2

ATMOSPHERIC MOTION
AIR MASS ANALYSIS
SATELLITE PHOTOGRAPHY AS A MEANS OF EVALUATING THE EQUATIONS OF VERTICAL MOTION.
AD-438 918 DIV. 2

ATMOSPHERICS
PHYSICS
STUDIES IN THE PHYSICS OF ROUGHLY DISPERSED AEROSOLS.
AD-439 010 DIV. 25

ATOMS
PHYSICAL PROPERTIES
SOLUTIONS OF THE THOMAS-FERMI-DIRAC STATISTICAL MODEL OF ATOMS.
AD-438 434 DIV. 20

ATOMS
STATICAL ANALYSIS
SOLUTIONS OF THE THOMAS-FERMI-DIRAC STATISTICAL MODEL OF ATOMS.
AD-438 434 DIV. 20

ATTENTION
SENSORY DEPRIVATION
PIONEER VI. VIGILANCE AS A FUNCTION OF SENSORY DEPRIVATION AND SOCIAL ISOLATION.
AD-439 432 DIV. 28

ATTITUDE CONTROL SYSTEMS
MANNED SPACECRAFT
APPLICATION OF HIGH MOMENT-PRODUCING TECHNIQUES FOR CONTROL OF A MANNED SPACE VEHICLE.
AD-439 201 DIV. 18

ATTITUDES
ANALYSIS
RATINGS BY OFFICER GROUPS OF IMPORTANCE AND OBTAINABILITY OF SELECTED JOB CHARACTERISTICS.
AD-437 954 DIV. 28

AURORAE
ELECTRONS
IMPROVEMENT OF PHOTOMULTIPLIER RESPONSE AND DEVELOPMENT OF A DEVICE FOR MEASUREMENT OF KEV AURORAL ELECTRONS.
AD-438 427 DIV. 25

AUTOMATION
COMMUNICATION SYSTEMS
INFORMATION SYSTEMS INTEGRATION.
AD-438 429 DIV. 5

AUTONOMIC NERVOUS SYSTEM
BRAIN
RESEARCH ON BRAIN STEM MECHANISMS REGULATING AUTONOMIC ACTIVITIES.
AD-438 640 DIV. 16

AVIATION PERSONNEL
MOTIVATION
SEPARATION OF AVIATION OFFICER CANDIDATES FROM CADETS FOR PURPOSES OF PREDICTING VOLUNTARY WITHDRAWALS.
AD-438 639 DIV. 28

AXIALLY SYMMETRIC FLOW
MATHEMATICAL MODELS
TWO DIMENSIONAL OR AXIALLY SYMMETRIC REAL GAS FLOWS BY THE METHOD OF CHARACTERISTICS. PART IV.
NONEQUILIBRIUM FLOW RESEARCH.
AD-438 263 DIV. 4

BACTERIA
GENETICS
GENETIC AND BIOCHEMICAL STUDIES ON THE CELL-FREE FORMATION OF TRYPTOPHAN SYNTHETASE IN ESCHERICHIA COLI.
AD-439 071 DIV. 16

BACTERIA
INHIBITION
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
AD-438 543 DIV. 16
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS.
AD-438 544 DIV. 16

BACTERIA
INTESTINES
CORRELATION BETWEEN SUSCEPTIBILITY TO ORAL INFECTION AND INTESTINAL BACTERIAL FLORA IN THE INBRED MOUSE STRAINS RAISED BY BROTHER SISTER MATINGS IN OUR LABORATORY.
AD-438 692 DIV. 16

BACTERIA
SPACECRAFT CABINS
MICROBIOLOGIC STUDIES OF THE TWO-MAN SPACE CABIN SIMULATOR. INTERCHANGE OF ORAL AND INTESTINAL BACTERIA.
AD-439 097 DIV. 16

BACTERIOPHAGES
CHEMICAL ANALYSIS
GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIAL DNA.
AD-439 066 DIV. 16

BACTERIOPHAGES
CULTURE MEDIA
GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIALDNA.
AD-439 056 DIV. 16

BACTERIOPHAGES
PARTICLES
GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIAL DNA.
AD-439 065 DIV. 16

BAINITE
MECHANICAL PROPERTIES
PROPERTIES OF ULTRA-HIGH STRENGTH BAINITIC STRUCTURES.
AD-439 842 DIV. 17

BAINITE
TRANSFORMATIONS
THERMOMECHANICAL TREATMENTS APPLIED TO ULTRAHIGH STRENGTH BAINITES.
AD-439 231 DIV. 17

BALL BEARINGS
LUBRICATION
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
AD-439 606 DIV. 24

BALL BEARINGS
MOUNTING BRACKETS
INVESTIGATION OF SELF-ALIGNING BEARING MOUNTINGS FOR SPACE OPERATION.
AD-439 856 DIV. 24

BALLISTIC MISSILE SUBMARINES
STIFFENED CYLINDERS
HYDROSTATIC PRESSURE TESTS OF A RING-STIFFENED CYLINDER OF OVAL CROSS SECTION (MAJOR-TO-MINOR AXIS RATIO OF 1.5).
AD-439 208 DIV. 31

BALLISTICS
TABLES
METEOROLOGICAL DATA REPORT AEROBEE KF 3.3.
AD-439 680 DIV. 18

BALLISTOCARDIOGRAPHY
ANALYSIS
SIGNIFICANT PHYSIOLOGICAL PARAMETERS OF THE BALLISTOCARDIOGRAM AS ANALYZED BY A MATHEMATICAL MODEL.
AD-439 502 DIV. 16

BALLOONS
POLYETHYLENE PLASTICS
POLYPROPYLENE BALLOON STUDY.
AD-439 357 DIV. 1

BARGES
OCEANOGRAPHIC EQUIPMENT
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH + DEVELOPMENT STATION (FORDS). VOLUME I.
AD-438 811 DIV. 31
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH AND DEVELOPMENT STATION (FORDS), VOLUME II, PHASE 1A.

THE IDENTIFICATION AND MODE OF ACTION OF MIYAGAWANELLA AS RELATED TO TRACHOMA, ATYPICAL PNEUMONIA AND OTHER CLINICAL DISORDERS INCLUDING THE THERAPEUTIC IMPLICATIONS THEREOF,
AD-438 530 DIV. 16

COMMUNICABLE DISEASES
VIRUSES
THE IDENTIFICATION AND MODE OF ACTION OF MIYAGAWANELLA AS RELATED TO TRACHOMA, ATYPICAL PNEUMONIA AND OTHER CLINICAL DISORDERS INCLUDING THE THERAPEUTIC IMPLICATIONS THERE OF,
AD-438 528 DIV. 16
THE IDENTIFICATION AND MODE OF ACTION OF MIYAGAWANELLA AS RELATED TO TRACHOMA, ATYPICAL PNEUMONIA AND OTHER CLINICAL DISORDERS INCLUDING THERAPEUTIC IMPLICATIONS THEREOF,
AD-438 529 DIV. 16

COMMUNICATION SYSTEMS
MILITARY ORGANIZATIONS
MILITARY INFORMATION SYSTEMS,
AD-438 430 DIV. 5

COMMUNICATION SYSTEMS
NETWORKS
PROPERTIES OF LOSSY COMMUNICATION NETS,
AD-439 437 DIV. 5

COMMUNICATION SYSTEMS
SCATTERING
THE WEST FORD ANTENNA SYSTEM,
AD-438 879 DIV. 8

COMMUNICATIONS SATELLITES (ACTIVE)
RANGE FINDING
RESEARCH DIRECTED TOWARD THE INVESTIGATION OF SUITABILITY OF THE GLOTRAC TYPE G TRANSPONDER FOR USE IN THE RANGE CALIBRATION SATELLITE,
AD-438 936 DIV. 6

COMPATIBILITY
REFRACTORY METAL ALLOYS
FACTORS AFFECTING THE COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS,
AD-439 675 DIV. 17

COMPOSITE MATERIALS
BONDING
INVESTIGATION OF BONDING IN OXIDE-FIBER (WHISKER) REINFORCED METALS,
AD-438 844 DIV. 14

COMPOSITE MATERIALS
MANUFACTURING METHODS
SILICA FIBER FORMING AND CORE SHEATH COMPOSITE FIBER DEVELOPMENT,
AD-438 145 DIV. 14

COMPOSITE MATERIALS
METALS
FIBER-REINFORCED METALS AND ALLOYS,
AD-438 921 DIV. 17

COMPUTER LOGIC
DESIGN
THE LOGIC DESIGN OF ADAM, A PROBLEM-ORIENTED SYMBOL PROCESSOR,
AD-438 705 DIV. 30

COMPUTER LOGIC
SYNTHESIS
AN ALGORITHM FOR SYNTHESIZING NOR LOGIC CIRCUITS,
AD-439 014 DIV. 30
SYNTHESIS OF LOGIC FUNCTIONS ON AN ARRAY OF INTEGRATED CIRCUITS,
AD-439 664 DIV. 30

CONCRETE
GAMMA-RAY SCATTERING
MONTE CARLO COMPUTATION OF 100,000 1 MEV GAMMA RAYS SCATTERED BY CONCRETE SLABS,
AD-438 908 DIV. 20

CONDENSATION
THEORY
CAPTURE COEFFICIENTS OF GASES AT 77 K,
AD-438 484 DIV. 25

CONICAL BODIES
BUCKLING (MECHANICS)
REPEATED BUCKLING OF CIRCULAR CYLINDRICAL SHELLS AND CONICAL FRUSTA BY AXIAL COMPRESSIVE FORCES,
AD-439 013 DIV. 25

CONTROL SYSTEMS
OPTIMIZATION
OPTIMIZING FOR MINIMUM RESPONSE TIME IN A LINEAR SYSTEM WITH LIMITED CONTROL EFFORT,
AD-439 262 DIV. 14

COOLING
MODULES (ELECTRONIC)
SOLID-STATE COOLING OF FUNCTIONAL ELECTRONIC BLOCKS,
AD-439 203 DIV. 8

COOLING
THERMOELECTRICITY
SOLID-STATE COOLING OF FUNCTIONAL ELECTRONIC BLOCKS,
AD-439 203 DIV. 8

COPPER
FINISHES AND FINISHING
EVALUATION OF MARK I CRYOPANEL COATINGS,
AD-438 903 DIV. 14

CORROSION
HIGH-TEMPERATURE RESEARCH
FACTORS AFFECTING THE COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS,
AD-439 675 DIV. 17

COSTS
MODELS (SIMULATIONS)
TECHNICAL STUDIES IN TRANSPORTATION; TRANSPORTATION COST FINDING,
AD-438 146 DIV. 33

COUPLED ANTENNAS
RADIOFREQUENCY INTERFERENCE
DERIVATION OF AEROSPACE ANTENNA COUPLING-FACTOR INTERFERENCE PREDICTION TECHNIQUES,
AD-438 208 DIV. 8

CRIMINOLOGY
CHILDREN
THE SERVICE-RELATED EXPERIENCE OF A SAMPLE OF JUVENILE DELINQUENTS. II. A REPLICATION ON A LARGER SAMPLE IN ANOTHER STATE,
AD-438 025 DIV. 32

CRYOGENICS
MATERIALS
CRYOGENIC MATERIALS DATA HANDBOOK,
AD-438 718 DIV. 17

CRYSTAL GROWTH
SINGLE CRYSTALS
GROWTH AND CHARACTERIZATION OF SINGLE CRYSTALS OF RARE EARTH COMPOUNDS,
AD-438 516 DIV. 25
THE KINETICS OF DIFFUSION CONTROLLED WHISKER GROWTH,
AD-439 497 DIV. 25

CRYSTALS
LASERS
CRYSTALS FOR OPTICAL MASER APPLICATIONS,
AD-438 422 DIV. 25

CRYSTALS
OSCILLATION
ON THE PROBABILITY OF THE PHONONLESS TRANSITION IN THE IMPURITY CENTERS OF CRYSTALS,
AD-437 958 DIV. 25

CRYSTALS
SINGLE SIDEBAND COMMUNICATION SYSTEMS
5 MC SINGLE SIDEBAND CRYSTALS,
AD-438 514 DIV. 8

CRYSTALS
X-RAY DIFFRACTION ANALYSIS
X-RAY DIFFRACTION STUDIES OF THERMAL MOTIONS IN CRYSTALS,
AD-439 003 DIV. 25

CULICIDAE
CENTRAL AMERICA
MOSQUITOES OF MIDDLE AMERICA,
AD-438 886 DIV. 16

CULTURE MEDIA
BACTERIOPHAGES
GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIALDNA,
AD-439 056 DIV. 16

CYCLONES
WEATHER FORECASTING
SUMMARY OF VERIFICATION OF NUMERICAL OPERATIONAL TROPICAL CYCLONE FORECAST TRACKS FOR 1963,
AD-438 835 DIV. 2

CYLINDRICAL BODIES
BUCKLING (MECHANICS)
REPEATED BUCKLING OF CIRCULAR CYLINDRICAL SHELLS AND CONICAL FRUSTA BY AXIAL COMPRESSIVE FORCES,
AD-439 013 DIV. 25
A NON-LINEAR MODEL STUDY OF THE THERMAL BUCKLING OF THIN ELASTIC SHELLS,
AD-439 043 DIV. 25

CYLINDRICAL BODIES
COMPRESSIVE PROPERTIES
BIAXIAL HYDROSTATIC COMPRESSION TESTING OF STIFFENED AND UNSTIFFENED CYLINDERS: OPTIMUM FILAMENT DIAMETER,
AD-439 655 DIV. 24

CYLINDRICAL BODIES
PRESSURE
ELASTIC AND PLASTIC STRESS EQUATIONS FOR HOLLOW CYLINDERS AND SPHERES SUBJECTED TO INTERNAL AND EXTERNAL PRESSURE,
AD-439 614 DIV. 25

CYLINDRICAL BODIES
STRESSES
NUMERICAL TREATMENT OF AN INTEGRAL EQUATION ARISING IN A MIXED-BOUNDARY ELASTICITY PROBLEM,
AD-437 920 DIV. 18

CYTOLOGY
CANCER
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY,
AD-438 531 DIV. 16
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY,
AD-438 532 DIV. 16

DAMPING
MEASUREMENT
AN INVESTIGATION OF A METHOD FOR MEASURING LOCALIZED DAMPING,
AD-439 592 DIV. 17

DATA PROCESSING SYSTEMS
AIR FORCE
FUTURE TRENDS IN AIR FORCE DATA SYSTEMS,
AD-439 333 DIV. 30

DATA PROCESSING SYSTEMS
INFORMATION RETRIEVAL
NAVIC POL INFORMATION SYSTEM, CAPABILITY EXPANSION FOR CONSUMPTION DATA, PROGRAMMERS, USERS, AND OPERATORS MANUAL,
AD-438 836 DIV. 30

DATA PROCESSING SYSTEMS
INSTRUCTION MANUALS
INSTRUCTION MANUAL FOR FLIGHT PROGRESS STRIP LOADER TYPE II,
AD-438 235 DIV. 33

DECABORANES
NUCLEAR MAGNETIC RESONANCE
32 MC, B'' N.M.R. SPECTRA OF B2C2B4H6 AND 1-1000 B10H13,
AD-439 005 DIV. 4

DECOMPOSITION
ANTIBIOTICS
EXPLORATION OF NEW CHEMOTHERAPEUTI FOR INFECTIOUS DISEASES,
AD-439 314 DIV. 4
EXPLORATION OF NEW CHEMOTHERAPEUTI FOR INFECTIOUS DISEASES,
AD-439 315 DIV. 4

DEFORMATION
MATHEMATICAL ANALYSIS
ON THE EQUIVALENCE OF POLYNOMIAL AND FUNCTIONAL FORMS OF CONSTITUTIVE EQUATIONS FOR A CLASS OF LARGE DEFORMATIONS,
AD-439 647 DIV. 28

DEFORMATION
STRESSES
PROBLEMS OF SMALL STRAINS SUPERPOSED ON FINITE DEFORMATION IN VISCOELASTIC SOLIDS,
AD-439 676 DIV. 28

DEFORMATION
THEORY
A NOTE ON THE MECHANICAL CONSTITUTIVE EQUATIONS FOR MATERIALS WITH MEMORY,
AD-439 265 DIV. 18

DEFORMATION
ULTRASONIC RADIATION
EFFECTS OF ULTRASOUND ON DEFORMATION CHARACTERISTICS OF STRUCTURAL METALS,
AD-439 384 DIV. 17

DELAY ELEMENTS (EXPLOSIVE)
DETONATING CORD
PYROTECHNIC DELAY DEVICES FOR LOW ENERGY DETONATING CORD SYSTEMS,
AD-438 910 DIV. 22

DELAY LINES
MATHEMATICAL MODELS
SELECTION OF A DELAY LINE MODEL,
AD-438 258 DIV. 26

DENSITY
DATA
CLIMATOLOGICAL DENSITY DATA FOR FORTY EURASIAN STATIONS,
AD-439 290 DIV. 2

DENSITY
GRAPHITE
THE DETERMINATION OF DESIGN CRITERIA FOR GRADE CPZ GRAPHITE,
AD-438 206 DIV. 14

DENTISTRY
HEMATOLOGY
HEMATOLOGIC CHANGES FOLLOWING SIMPLE EXODONTIA,
AD-439 666 DIV. 16

DENTISTRY
SURGICAL TECHNIQUES
FOAM MANDIBULAR SPLINT,
AD-437 987 DIV. 16

DEOXYRIBONUCLEIC ACID
METABOLISM
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM,
AD-439 062 DIV. 16

FOR THE PRODUCTION OF SILICON MONOXIDE CAPACITORS MICROELEMENT, AD-439 486 DIV. 8

CARBOHYDRATES
METABOLISM
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY, AD-438 751 DIV. 16
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY, AD-438 752 DIV. 16
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY, AD-438 753 DIV. 16

CARDIOVASCULAR SYSTEM
THROAT
THORACIC CAGE IMPEDANCE MEASUREMENT IMPEDANCE PLETHYSMOGRAPHIC DETERMINATION OF CARDIAC OUTPUT (A COMPARATIVE STUDY), AD-439 088 DIV. 16

CARTRIDGES (PAD)
ABSTRACTS)
ABSTRACTS OF PROJECTS ON PROPELLANT ACTUATED DEVICES FOR THE U.S. AIR FORCE, AD-439 662 DIV. 12

CATHODE RAY TUBES
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES, AD-439 485 DIV. 8

CATHODES (ELECTRON TUBES)
TUNNELING (ELECTRINICS)
THIN-FILM COLD CATHODES FOR MICROWAVE TUBES, AD-438 938 DIV. 8

CAVITATION
DAMAGE
TEMPERATURE EFFECTS IN CAVITATION DAMAGE, AD-438 223 DIV. 4

CAVITATION
DISKS
A PRELIMINARY STUDY OF THE EFFECT OF THE FREE SURFACE ON A THREE-DIMENSIONAL CAVITY PRODUCED BY A CIRCULAR DISK, AD-439 380 DIV. 9

CAVITATION
FLUID DYNAMIC PROPERTIES
VOID FRACTION MEASUREMENTS IN CAVITATING MERCURY, AD-438 262 DIV. 9

CELL DIVISION
RADIATION EFFECTS
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS, AD-439 277 DIV. 16

CELLS (BIOLOGY)
ELECTRON MICROSCOPY
SUBJECT OF INVESTIGATION STUDIES OF THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY, AD-438 533 DIV. 16

CELLS (BIOLOGY)
PATHOLOGY
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY, AD-439 067 DIV. 16

CELLS (BIOLOGY)
TOXINS + ANTITOXINS
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY, AD-439 068 DIV. 16

CELLULOSIC PLASTICS
BATTERY SEPARATORS
CHARACTERIZATION OF CELLOPHANE AS AN IONIC BARRIER, AD-437 997 DIV. 14

CENTRAL NERVOUS SYSTEM
RADIATION EFFECTS
THE EFFECT OF COBALT-60 GAMMA RADIATION ON THE CENTRAL NERVOUS SYSTEM, AD-439 300 DIV. 16

CERAMIC FIBERS
REINFORCING MATERIALS
INVESTIGATION OF BONDING IN OXIDE-FIBER (WHISKER)REINFORCED METALS, AD-438 844 DIV. 14

CERAMIC MATERIALS
FUEL CELLS
RESEARCH AND DEVELOPMENT OF AN ADVANCED LABORATORY LIQUID METAL REGENERATIVE FUEL CELL, AD-438 519 DIV. 7

CERAMIC MATERIALS
PROCESSING
SILICA FIBER FORMING AND CORE SHEATH COMPOSITE FIBER DEVELOPMENT, AD-438 145 DIV. 14
A FUNDAMENTAL STUDY OF THE VARIABLES ASSOCIATED WITH THE MIXING OF CERAMIC RAW MATERIALS, AD-439 599 DIV. 14

CERAMIC MATERIALS
THERMODYNAMICS
THERMODYNAMICS OF REFRACTORY COMPOUNDS OF BERYLLIUM (OXIDES, BORIDES, CARBIDES, AND NITRIDES): AN ANNOTATED BIBLIOGRAPHY, AD-439 445 DIV. 14

CEREBRAL CORTEX
DAMAGE
STUDIES OF: (A) THE VISUAL FIELDS OF MONKEYS (B) MEMORY PROCESSES AS AFFECTED BY CEREBRAL LESIONS IN MONKEYS, AD-438 389 DIV. 16

CERENKOV RADIATION
GENERATORS
CERENKOV MICROWAVE GENERATOR, AD-438 053 DIV. 25

CESIUM
LIQUID METALS
FACTORS AFFECTING THE COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS, AD-439 675 DIV. 17

CHEMICAL ANALYSIS
ALGAE
CHEMICAL COMPOSITION AND APPLICABILITY AS FOOD AND FEED OF MASS-CULTURED UNICELLULAR ALGAE, AD-438 658 DIV. 16

CHEMICAL WARFARE AGENTS
DETECTORS
RESEARCH, DEVELOPMENT AND FABRICATION OF AN EXPENDABLE BIOELECTROCHEMICAL DETECTOR SYSTEM, AD-439 398 DIV. 3

CHEMOTHERAPEUTIC AGENTS
INFECTIONS
EXPLORATION OF NEW CHEMOTHERAPEUTIC FOR INFECTIOUS DISEASES, AD-439 309 DIV. 14

CHEMOTHERAPEUTIC AGENTS
MOLECULAR STRUCTURE
EXPLORATION OF NEW CHEMOTHERAPEUTIC FOR INFECTIOUS DISEASES, AD-439 316 DIV. 16

CHEMOTHERAPEUTIC AGENTS
PARASITIC DISEASES
STUDIES ON IMMUNOLOGICAL DIAGNOSIS OF PARAGONIMIASIS, AD-438 535 DIV. 16
STUDIES ON PARAGONIMIASIS, AD-438 536 DIV. 16
STUDIES ON PARAGONIMIASIS, AD-438 537 DIV. 14
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS, AD-438 538 DIV. 16

CHEMOTHERAPY
PARASITIC DISEASES
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS, AD-439 255 DIV. 16

CHEMOTHERAPY
CANCER
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS, AD-438 541 DIV. 16

CHEMOTHERAPY
ISONIAZID
STUDIES ON ISONIAZID METABOLISM IN JAPANESE AND ISONIAZID RESISTANCE, AD-438 746 DIV. 16

CHEMOTHERAPY
MYCOBACTERIUM TUBERCULOSIS
STUDIES ON METABOLISM OF ISONIAZID, AD-438 747 DIV. 16

CHEMOTHERAPY
PARASITIC DISEASES
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND CHEMOTHERAPY OF PARAGONIMIASIS (LUNG FLUKE DISEASE), AD-439 253 DIV. 16
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS, AD-439 254 DIV. 16

CHLAMYDIA TRACHOMATIS
CYTOLOGY
ON THE GROWTH MECHANISM OF PSITTACOSIS TRACHOMA VIRUS IN TISSUE CULTURES, AD-439 069 DIV. 16

CHLORELLA
NUTRITION
CHEMICAL COMPOSITION AND APPLICABILITY AS FOOD AND FEED OF MASS-CULTURED UNICELLULAR ALGAE, AD-438 657 DIV. 16

CHLORINE COMPOUNDS
CHEMICAL REACTIONS
BRIEF DISCUSSION OF RESEARCH IN FLUORINE CHEMISTRY, AD-439 658 DIV. 4

CHROMOSOMES
NEOPLASMA
STUDIES ON THE CHROMOSOMAL DIFFERENCES AMONG VARIOUS ASCITES HEPATOMAS OF RATS, AD-438 652 DIV. 16

CHROMOSOMES
RADIATION EFFECTS
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS, AD-438 539 DIV. 16

CIRCUITS
DESIGN
THE DESIGN AND ANALYSIS OF ELECTRICAL ELECTRONIC SYSTEMS BY MEANS OF DIGITAL COMPUTERS: AN ANNOTATED BIBLIOGRAPHY, AD-439 440 DIV. 8

CIVIL DEFENSE SYSTEM
OPERATION
PROTECTION FACTORS OF EMERGENCY SHELTERS IN A BRITISH RESIDENCE, AD-439 633 DIV. 29

CIVIL DEFENSE SYSTEMS
PREPARATION
THE USE OF VOLUNTARY ORGANIZATIONS IN CIVILIAN DEFENSE AND PREPAREDNESS, AD-439 612 DIV. 18

CIVIL DEFENSE SYSTEMS
RADIOACTIVE FALLOUT
PROTECTION FACTORS OF EMERGENCY SHELTERS IN A BRITISH RESIDENCE, AD-439 332 DIV. 20

CLEANING
GASES
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS, AD-438 865 DIV. 25

CLIMATOLOGY
MALAYA
VISIBILITY CONDITIONS IN MALAYA, AD-439 510 DIV. 2

CLIMATOLOGY
PANAMA
CLIMATOLOGICAL STUDY OF RADAR ECHO PICTURES FROM ALBROOK AIR FORCE BASE, PANAMA, AD-438 951 DIV. 2

CLIMATOLOGY
WEATHER STATIONS
CLIMATOLOGICAL DENSITY DATA FOR FORTY EURASIAN STATIONS, AD-439 290 DIV. 2

CLOTHING
PERMEABILITY
SPECIAL STUDY OF A METHOD FOR OBJECTIVELY DETECTING THE INSTANT AND LOCATION OF RAINFALL PENETRATION THROUGH FIELD CLOTHING, AD-437 928 DIV. 29

CLOUDS
MICROANALYSIS
STUDIES IN THE PHYSICS OF ROUGHLY DISPERSED AEROSOLS, AD-439 010 DIV. 29

CLOUDS
UPPER ATMOSPHERE
FORBIDDEN REGIONS FOR THE FORMATION OF CLOUDS IN A PLANETARY ATMOSPHERE, AD-438 216 DIV. 2

COATINGS
CRYOGENICS
EVALUATION OF MARK I CRYOPANEL COATINGS, AD-438 403 DIV. 14

COBALT COMPOUNDS
OXIDES
STUDY OF OXIDES FOR O2 -N2 SEPARATION, AD-438 163 DIV. 4

COLD CATHODE TUBES
TUNNELING (ELECTRONICS)
THIN-FILM COLD CATHODES FOR MICROWAVE TUBES, AD-438 938 DIV. 8

COLD CATHODE TUBES
X-RAY TUBES
DEVELOPMENT OF HIGH PERFORMANCE COLD CATHODE FLASH X-RAY TUBES, AD-439 094 DIV. 8

COMBUSTION
SUPERSONIC FLOW
UNIDIMENSIONAL THEORY OF SUPERSONIC COMBUSTION, AD-438 664 DIV. 10

COMMAND + CONTROL SYSTEMS
STRATEGIC AIR COMMAND
STRATEGIC AIR COMMAND CONTROL SYSTEM (465L), AD-439 359 DIV. 5

COMMUNICABLE DISEASES
THERAPY

ELECTRODEPOSITION
SILVER COMPOUNDS
THE FORMATION OF THIN ANODIC FILMS OF SILVER OXIDE.
AD-438 108 DIV. 4

ELECTRODES
STORAGE BATTERIES
LITHIUM-SILVER CHLORIDE SECONDARY BATTERY INVESTIGATION.
AD-439 399 DIV. 7

ELECTROENCEPHALOGRAPHY
BLACKOUT (PHYSIOLOGY)
ELECTROENCEPHALOGRAPHIC CHANGES IN HUMAN SUBJECTS DURING BLACKOUT PRODUCED BY POSITIVE ACCELERATION.
AD-438 488 DIV. 14

ELECTROENCEPHALOGRAPHY
INFANTS
MATURATION OF ELECTROENCEPHALOGRAPH EVOKED POTENTIALS.
AD-437 930 DIV. 14

ELECTROENCEPHALOGRAPHY
SENSITIVITY
RUSSIAN TRANSLATION ON METHODS OF DETECTING WEAK BIOELECTRICAL RESPONSES.
AD-438 783 DIV. 14

ELECTROLUMINESCENCE
DIODES (SEMICONDUCTOR)
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT.
AD-438 959 DIV. 8

ELECTROMAGNETIC FIELDS
GASES
NON-LINEAR INTERACTIONS OF ELECTROMAGNETIC FIELDS WITH MATTER.
AD-439 435 DIV. 25

ELECTROMAGNETIC WAVES
ENERGY
MOLECULAR STORAGE AND TRANSFER OF ELECTROMAGNETIC ENERGY IN GASEOUS PLASMAS.
AD-438 419 DIV. 25

ELECTROMAGNETIC WAVES
IONOSPHERIC PROPAGATION
RESEARCH ON ELECTROMAGNETIC NOISE AT EXTREMELY LOW FREQUENCIES.
AD-439 440 DIV. 8
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS.
AD-439 831 DIV. 25
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS.
AD-439 839 DIV. 25
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS.
AD-439 846 DIV. 25

ELECTROMAGNETIC WAVES
PROPAGATION
THE PROPAGATION OF ELECTROMAGNETIC WAVES IN A STATISTICALLY INHOMOGENEOUS MEDIUM II A CRITIQUE OF THE CURRENT THEORY.
AD-438 488 DIV. 8
STEADY AND UNSTEADY MOTION IN MAGNETO-FLUID DYNAMICS.
AD-438 560 DIV. 25

ELECTRON DENSITY
PLASMA JETS
DETERMINATION OF ELECTRON DENSITY DISTRIBUTION IN A PLASMA JET USING A LANGMUIR PROBE.
AD-439 007 DIV. 25

ELECTRON GUNS
KLYSTRONS
HIGH PERVEANCE GUN STUDY.
AD-438 521 DIV. 8

ELECTRON GUNS
PULSE MODULATORS
A 550-MEGAWATT PULSE MODULATOR.
AD-439 218 DIV. 8

ELECTRON MICROSCOPY
MEDICAL RESEARCH
SUBJECT OF INVESTIGATION STUDIES OF THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY.
AD-438 533 DIV. 14

ELECTRON TUBES
RADIATION DAMAGE
ELECTRON TUBES RADIATION RESISTANT PILOT LINE PRODUCTION.
AD-439 240 DIV. 8
DESIGN AND DEVELOPMENT INVESTIGATION OF A LOW NOISE, LINEAR, VARIABLE GAIN, R.F. AMPLIFIER TUBE.
AD-438 401 DIV. 8

ELECTRON TUBES
SCIENTIFIC RESEARCH
RESEARCH IN PHYSICS OF ELECTRON EMISSION AND ELECTRON TUBE TECHNOLOGY.
AD-439 716 DIV. 25

ELECTRONIC EQUIPMENT
DISPLAY SYSTEMS
DEVELOPMENT OF A SOLID-STATE DISPLAY DEVICE.
AD-438 029 DIV. 8

ELECTRONIC SWITCHES
DIODES (SEMICONDUCTORS)
C- AND KU-BAND SEMICONDUCTOR TR DEVICES.
AD-438 026 DIV. 8

ELECTRONIC SWITCHES
DIODES (SEMICONDUCTOR)
SOLID-STATE MICROWAVE TR-ATR SWITCH PRODUCTION ENGINEERING MEASURES PROGRAM.
AD-438 858 DIV. 8

ELECTRONIC SWITCHES
MERCURY
HIGH POWER MERCURY SWITCH.
AD-438 254 DIV. 8

ELECTRONICS
INDEXES
ECAC THESAURUS OF KEYWORDS.
AD-439 204 DIV. 32

ELECTRONICS
MAINTENANCE
IMPLEMENTATION AND CHECKOUT OF THE FORECAST CONCEPT OF ELECTRONIC SYSTEM REPAIR AT THE U.S. ARMY ORDNANCE GUIDED MISSILE SCHOOL.
AD-438 010 DIV. 8

ELECTRONICS
NAVAL PERSONNEL
TRAINING, UTILIZATION, AND PROFICIENCY OF NAVY ELECTRONICS TECHNICIANS. V. WORK DIARIES.
AD-438 213 DIV. 26

ELECTRONICS
SIMULATION
THE DESIGN AND ANALYSIS OF ELECTRICAL ELECTRONIC SYSTEMS BY MEANS OF DIGITAL COMPUTERS! AN ANNOTATED BIBLIOGRAPHY.
AD-439 440 DIV. 8

ELECTRONS
AURORAE
IMPROVEMENT OF PHOTOMULTIPLIER RESPONSE AND DEVELOPMENT OF A DEVICE FOR MEASUREMENT OF KeV AURORAL ELECTRONS.
AD-438 427 DIV. 25

ELECTRONS
EMISSIVITY
RESEARCH IN PHYSICS OF ELECTRON EMISSION AND ELECTRON TUBE TECHNOLOGY.
AD-439 716 DIV. 25

ELECTRONS
EXCITATION
THE EFFECTS OF ELECTRONIC EXCHANGE ON THE EFFICIENCY OF VIBRATIONAL EXCITATION BY MOLECULAR COLLISIONS.
AD-439 604 DIV. 25

ELECTRONS
NEON
ELECTRON COLLISIONS IN NEON PLASMA.
AD-439 438 DIV. 25

ELECTROPHOTOGRAPHY
PHOTOGRAPHIC PLATES
DEVELOPMENT OF A CAMERA-SPEED XEROGRAPHIC PLATE.
AD-439 728 DIV. 24

EMISSIVITY
LUNAR ENVIRONMENT
RADIATIVE TRANSPORT OF HEAT IN LUNAR AND PLANETARY INTERIORS.
AD-439 434 DIV. 2

ENDOCRINE GLANDS
NERVOUS SYSTEM
NEUROENDOCRINE STUDIES OF EPILEPTIC PATIENTS.
AD-438 885 DIV. 14

ENERGY
STORAGE
MOLECULAR STORAGE AND TRANSFER OF ELECTROMAGNETIC ENERGY IN GASEOUS PLASMAS.
AD-438 419 DIV. 25

ENGINEERING
EDUCATION
SYSTEMS RELIABILITY ENGINEERING GRADUATE CURRICULUM.
AD-438 173 DIV. 23

ENTEROBACTERIACEAE
DYSENTERY
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS).
AD-439 295 DIV. 14

ENZYMES
INHIBITION
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES.
AD-439 317 DIV. 14
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES.
AD-439 318 DIV. 14
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES.
AD-439 319 DIV. 14
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES.
AD-439 320 DIV. 14

EPIDEMIOLOGY
PARASITIC DISEASES
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS.
AD-438 538 DIV. 14

EPILEPSY
ENDOCRINE GLANDS
NEUROENDOCRINE STUDIES OF EPILEPTIC PATIENTS.
AD-438 885 DIV. 14

EPITAXIAL GROWTH
IMPURITIES
EPITAXIAL CONTROL SYSTEM.
AD-437 938 DIV. 30

ESCHERICHIA
BIOCHEMISTRY
GENETIC AND BIOCHEMICAL STUDIES ON THE CELL-FREE FORMATION OF TRYPTOPHAN SYNTHETASE IN ESCHERICHIA COLI.
AD-439 071 DIV. 14

ETHERS
SYNTHESIS (CHEMISTRY)
SYNTHESIS OF SELECTED ETHERS, PHENOLS AND RELATED COMPOUNDS HAVING NITROGEN-CONTAINING GROUPS.
AD-439 242 DIV. 4

EUBACTERIALES
ANTIGEN-ANTIBODY REACTIONS
ANTIBIOTICS FOR EUBACTERIALES.
AD-438 468 DIV. 14

EUROPIUM COMPOUNDS
CRYSTAL GROWTH
GROWTH AND CHARACTERIZATION OF SINGLE CRYSTALS OF RARE EARTH COMPOUNDS.
AD-438 516 DIV. 25

EXCITATION
ELECTRONS
THE EFFECTS OF ELECTRONIC EXCHANGE ON THE EFFICIENCY OF VIBRATIONAL EXCITATION BY MOLECULAR COLLISIONS.
AD-439 604 DIV. 25

EXCITATION
OSCILLATION
EXCITATION OF PLASMA OSCILLATIONS BY SHOCK WAVES.
AD-439 209 DIV. 25

EXPANDED PLASTICS
MECHANICAL PROPERTIES
MATERIAL -HRP -3/8 OX AND 3/4 OX HEXCEL FOAM FILLED CORE -SHEAR STRENGTH AND SHEAR MODULUS DETERMINATION OF.
AD-438 136 DIV. 14

EXPANDED PLASTICS
SHELTERS
RIGID FOAM PLASTICS SHELTERS BY SPRAY APPLICATION TO AIR-SUPPORTED MOLDS.
AD-437 901 DIV. 14

EXPLOSIVE ACTUATORS
ABSTRACTS
ABSTRACTS OF PROJECTS ON PROPELLANT ACTUATED DEVICES FOR THE U.S. AIR FORCE.
AD-439 662 DIV. 12

EXPLOSIVES INITIATORS
HAZARDS
RF HAZARD DETECTOR ADAPTED TO THE LITTLEJOHN MISSILE SYSTEM.
AD-437 919 DIV. 28

EXTRUSION
STEEL
MATERIAL EVALUATION OF D6AC STEEL EXTRUSION MECHANICAL AND METALLURGICAL PROPERTIES OF.
AD-438 779 DIV. 17

EYE
OXYGEN
REVIEW OF THE EFFECTS OF HIGH OXYGEN EXPOSURE TO THE EYE.
AD-438 909 DIV. 14

FATIGUE (MECHANICS)
DAMPING
AN INVESTIGATION OF A METHOD FOR MEASURING LOCALIZED DAMPING.
AD-439 592 DIV. 17

FEDERAL BUDGETS
FOREIGN POLICY
FOREIGN AID --IS IT WORTH CONTINUING.
AD-438 935 DIV. 16

FERRITES
ELECTROMAGNETIC PROPERTIES
INVESTIGATION OF MICROWAVE NON-LINEAR EFFECTS UTILIZING FERROMAGNETIC MATERIALS.
AD-438 185 DIV. 8

FERROMAGNETIC MATERIALS
FERRITES
INVESTIGATION OF MICROWAVE

STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM,
AD-439 064 DIV. 14

DESIGN
SIMULATION
SIMULATION SYSTEM PROGRAMMING DESIGN MANUAL,
AD-439 418 DIV. 30

DESOXYRIBONUCLEIC ACID METABOLISM
STUDIES ON DESOXYRIBONUCLEIC ACID METABOLISM,
AD-438 683 DIV. 14
STUDIES ON DESOXYRIBONUCLEIC ACID METABOLISM,
AD-439 063 DIV. 14
METABOLIC FUNCTION OF DEOXYNUCLEOSIC COMPOUNDS,
AD-439 274 DIV. 16

DESOXYRIBONUCLEIC ACID
SYNTHESIS
STUDIES ON DESOXYRIBONUCLEIC ACID METABOLISM,
AD-438 681 DIV. 16

DESOXYRIBONUCLEIC ACIDS
BIOSYNTHESIS
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM,
AD-438 682 DIV. 16

DETECTORS
DESIGN
RESEARCH, DEVELOPMENT AND FABRICATION OF AN EXPENDABLE BIOELECTROCHEMICAL DETECTOR SYSTEM,
AD-439 398 DIV. 3

DETECTORS
HAZARDS
RF HAZARD DETECTOR ADAPTED TO THE LITTLEJOHN MISSILE SYSTEM,
AD-437 919 DIV. 22

DETONATORS
SEA WATER
DEVELOPMENT OF PRECISION PRESSURE DETONATED DEEP SOUND SIGNALS,
AD-438 524 DIV. 22

DIAGNOSIS
RECORDING SYSTEMS
RECORDERS IN ELECTROMEDICAL DIAGNOSTIC APPARATUS,
AD-438 825 DIV. 16

DIATOMIC MOLECULES
ABSORPTION SPECTRUM
INSTITUTE FOR MOLECULAR PHYSICS,
AD-438 051 DIV. 25

DIELECTRICS
PROPAGATION
MICROWAVE INVESTIGATION OF THE DIELECTRIC WAVEGUIDE PROPAGATION BY MAGNETO-IONIC DUCTS,
AD-439 213 DIV. 25

DIELECTRICS
SURFACES
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS,
AD-438 865 DIV. 25

DIESEL ENGINES
COMBUSTION
COMBUSTION IN DIESEL ENGINES,
AD-439 447 DIV. 27

DIFFERENTIAL EQUATIONS
QUANTUM MECHANICS
SOME SOLVABLE POTENTIALS FOR THE SCHRODINGER EQUATION,
AD-439 424 DIV. 13

DIFFRACTION
IONOSPHERIC PROPAGATION
AN APPROXIMATE METHOD FOR COMPUTING DIFFRACTION PATTERNS CAUSED BY IONOSPHERIC IRREGULARITIES,
AD-437 981 DIV. 8

DIFFRACTION
THEORY
TRANSIENT SOLUTIONS FOR A CLASS OF DIFFRACTION PROBLEMS,
AD-439 210 DIV. 25

DIFFUSION
TURBULENCE
TURBULENT DIFFUSION OF HEAT AND MOMENTUM IN A HOMOGENEOUS AND ISOTROPIC TURBULENT STREAM,
AD-439 507 DIV. 9

DIGESTIVE SYSTEM DISEASES
DYSENTERY
THE STUDY ON THE PATHOGENESIS OF BACILLARY DYSENTERY,
AD-439 306 DIV. 14

DIGITAL COMPUTERS
PLOTTERS
INSTRUCTIONS FOR USING IBM 709 PLOTTING SUBROUTINES,
AD-437 918 DIV. 30

DIGITAL COMPUTERS
TEXTBOOKS
ARITHMETIC UNITS FOR ELECTRONIC DIGITAL COMPUTERS (ARIFMETICHESKIYE USTROYSTVA ELEKTRONNYKH TSIFROVYKH MASHIN),
AD-438 784 DIV. 30

DIODES (SEMICONDUCTORS)
RADAR DUPLEXERS
C- AND KU-BAND SEMICONDUCTOR TR DEVICES,
AD-438 026 DIV. 8

DIODES (SEMICONDUCTOR)
ELECTROLUMINESCENCE)
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT,
AD-438 959 DIV. 8

DISARMAMENT
MATHEMATICAL MODELS
VERIFICATION OF DISARMAMENT BY INSPECTION: A GAME THEORETIC MODEL,
AD-439 377 DIV. 18

DISARMAMENT
SPACE FLIGHT
SPACE ARMS CONTROL: TRENDS, CONCEPTS, PROSPECTS,
AD-438 436 DIV. 18

DISKS
SOUND TRANSMISSION
RADIATION OF SOUND FROM A CIRCULAR DISK WITH A UNIFORM PRESSURE DISTRIBUTION,
AD-439 374 DIV. 25

DISPLAY SYSTEMS
DESIGN
DEVELOPMENT OF A SOLID-STATE DISPLAY DEVICE,
AD-438 029 DIV. 8

DISPLAY SYSTEMS
RADIO NAVIGATION
RHO/RHO COMPUTER DISPLAY,
AD-438 175 DIV. 1

DISSOCIATION
FLUORESCENCE
PHOTODISSOCIATION AND FLUORESCENCE IN THE SCHUMANN-UV,
AD-438 456 DIV. 4

DOCUMENTATION
REVIEWS
AN INVESTIGATION OF THE TECHNIQUES AND CONCEPTS OF INFORMATION RETRIEVAL,
AD-439 924 DIV. 30

DOCUMENTATION
STATISTICAL ANALYSIS
A METHOD FOR IMPROVING COMPREHENSION OF TECHNICAL COMMUNICATIONS THROUGH STATISTICAL TESTING AND INFORMATION RETRIEVAL PROCEDURES,
AD-438 662 DIV. 30

DOCUMENTATION
USSR
SKY ILLUMINATION DURING ECLIPSE, ANNOTATED BIBLIOGRAPHY OF SOVIET-BLOC LITERATURE FOR THE PERIOD 1940-1963,
AD-439 226 DIV. 2

DOSE RATE
REACTOR HAZARDS
MEASUREMENTS OF THE EFFECTS OF COMPARTMENTALIZATION ON THE GAMMA-RAY AND NEUTRON DOSE RATE IN THE RADIATION FIELD OF A REACTOR,
AD-439 994 DIV. 20

DRUGS
METABOLISM
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM,
AD-439 296 DIV. 14

DUCTS
GAS FLOW
WALL ROUGHNESS EFFECTS ON INVISCID NONEQUILIBRIUM FLOW IN DUCTS,
AD-438 477 DIV. 9

DYNAMIC PROGRAMMING
TRAJECTORIES
A STUDY OF OPTIMIZATION TECHNIQUES,
AD-438 980 DIV. 13

DYSENTERY
ENTEROBACTERIACAE
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS),
AD-439 293 DIV. 16

DYSENTERY
ENTEROBACTERIACEA
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS,
AD-439 294 DIV. 16
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS),
AD-439 295 DIV. 16

DYSENTERY
ENTEROBACTERIACEAE
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL INFECTIONS),
AD-439 292 DIV. 14

DYSENTERY
PATHOLOGY
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS,
AD-438 458 DIV. 14
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS,
AD-438 460 DIV. 14

EAR
MUSCLES
NEURAL MECHANISMS FOR RESPONSES OF MIDDLE EAR MUSCLES,
AD-439 381 DIV. 16

ECHO RANGING
UNDERWATER
LATERAL ECHO SOUNDER -MODEL CL-1,
AD-437 905 DIV. 6

ECONOMICS
DYNAMIC PROGRAMMING
DYNAMIC PROGRAMMING OF ECONOMIC GROWTH,
AD-439 234 DIV. 32

ECONOMICS
FOREIGN POLICY
FOREIGN AID --IS IT WORTH CONTINUING,
AD-438 435 DIV. 18

ECONOMICS
OPTIMIZATION
OPTIMAL GROWTH IN A LINEAR-LOGARITHMIC ECONOMY,
AD-439 235 DIV. 32

EDUCATION
OPERATIONS RESEARCH
REGRESSION: AN ANALYTICAL AID FOR THE ADMISSION OF MASTER'S DEGREE CANDIDATES,
AD-438 915 DIV. 33

EDUCATION
SONAR PERSONNEL
USE OF AUTOMATED INSTRUCTION IN REVIEW MATHEMATICS FOR THE BASIC SONARMAN COURSE (C-560),
AD-438 255 DIV. 30

ELASTIC SHELLS
BUCKLING (MECHANICS)
A NON-LINEAR MODEL STUDY OF THE THERMAL BUCKLING OF THIN ELASTIC SHELLS,
AD-439 043 DIV. 25

ELASTICITY
PLASTICITY
ELASTIC AND PLASTIC STRESS EQUATIONS FOR HOLLOW CYLINDERS AND SPHERES SUBJECTED TO INTERNAL AND EXTERNAL PRESSURE,
AD-439 614 DIV. 25

ELECTRIC ARCS
PLASMA MEDIUM
PLASMA ARC DEPOSITION FOR AEROSPACE APPLICATIONS,
AD-438 969 DIV. 28

ELECTRIC CABLES
JUNGLES
COMMUNICATIONS CABLE FOR TROPICAL JUNGLE USE,
AD-437 910 DIV. 7

ELECTRIC DETONATORS
HAZARDS
CHARACTERISTICS OF HIGH CURRENT FIRING PULSES ON SQUIBS AND BLASTING CAPS,
AD-439 488 DIV. 22

ELECTRIC FIELDS
VERY LOW FREQUENCY
ELECTRIC FIELDS FROM AIRBORNE VERTICAL AND HORIZONTAL DIPOLES AT VERY-LOW FREQUENCIES,
AD-439 649 DIV. 8

ELECTRIC POWER PRODUCTION
LUNAR BASES
ENGINEERING STUDY OF MULTIPURPOSE ENGINE AND FUEL SYSTEM FOR MANNED LUNAR BASES,
AD-439 829 DIV. 7

ELECTRIC SWITCHES
NAVAL EQUIPMENT
MULTI-STATION PUSH BUTTON SWITCH,
AD-437 931 DIV. 7

ELECTRICAL CONDUCTANCE
BODY FLUIDS
THERMAL AND ELECTRICAL CONDUCTIVITIES OF BIOLOGICAL FLUIDS AND TISSUES,
AD-438 144 DIV. 16

ELECTRICAL NETWORKS
SIMULATION
THE DESIGN AND ANALYSIS OF ELECTRICAL ELECTRONIC SYSTEMS BY MEANS OF DIGITAL COMPUTERS: AN ANNOTATED BIBLIOGRAPHY,
AD-439 440 DIV. 8

ELECTROCHEMISTRY
INSTRUMENTATION
RESEARCH, DEVELOPMENT AND FABRICATION OF AN EXPENDABLE BIOELECTROCHEMICAL DETECTOR SYSTEM,
AD-439 398 DIV. 3

GUERRILLA WARFARE
PYROTECHNICS
IMPROVISED PYROTECHNIC MIXTURES FOR GUERRILLA WARFARE APPLICATIONS
AD-438 782 DIV. 3

GUIDED MISSILE COMPONENTS
RADIO COMMUNICATION SYSTEMS
WS-133B MINUTEMAN GROUND ELECTRONICS SYSTEM FIGURE A 14,25, RADIO SET AN/GRC-128. DETAILED TEST REQUIREMENTS FOR EVALUATION TEST PROGRAM,
AD-438 054 DIV. 12

GUIDED MISSILE LAUNCHERS
DRY DOCK EQUIPMENT
APPLICATION OF MOBILE DRYDOCK LAUNCH SYSTEM TO SPACE MISSIONS, VOLUME I SUMMARY,
AD-439 718 DIV. 12

GUIDED MISSILE RANGES
CALIBRATION
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE,
AD-438 872 DIV. 12
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE,
AD-438 873 DIV. 12
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE,
AD-438 874 DIV. 12
A SUMMARY OF CONFIGURATION DESIGN STUDIES FOR A RANGE INSTRUMENTATION CALIBRATION SATELLITE,
AD-439 358 DIV. 12

GUIDED MISSILES (SURFACE-TO-SURFACE)
ACCEPTABILITY
FTM 444, MODEL SPECIFICATION S-133-1000-0-1,
AD-438 922 DIV. 12
ACCEPTANCE SUMMARY REPORT -FTM 445,
AD-438 958 DIV. 12
ELECTROSTATIC GYRO EVALUATION PROGRAM, PHASE II, DEVELOPMENT OF ESG TEST EQUIPMENT,
AD-437 927 DIV. 19

GYROSCOPES
INERTIAL GUIDANCE
AB-3 STABILIZING GYRO DEVELOPMENT PROGRAM PLAN,
AD-438 506 DIV. 12

HALOCARBON PLASTICS
PRODUCTION
NITROSO RUBBER RESEARCH, DEVELOPMENT AND PRODUCTION,
AD-439 696 DIV. 14

HALOCARBON PLASTICS
THERMAL INSULATION
INVESTIGATION OF FLUORO COMPOUNDS FOR THERMAL PROTECTION,
AD-438 520 DIV. 14

HALOGENATED HYDROCARBONS
FLUORINE COMPOUNDS
LINEAR POLYFLUORINATED ANALAGOUSLY BIFUNCTIONAL COMPOUNDS AS POTENTIAL MONOMERS,
AD-437 962 DIV. 4

HANDBOOKS
CRYOGENICS
CRYOGENIC MATERIALS DATA HANDBOOK,
AD-438 718 DIV. 17

HANDBOOKS
TENTS
REFERENCE MANUAL ON TENTAGE,
AD-438 008 DIV. 29

HARMONIC ANALYSIS
SCATTERING
TRANSIENT SOLUTIONS FOR A CLASS OF DIFFRACTION PROBLEMS,
AD-439 210 DIV. 25

HEART
ANATOMY
RELATION BETWEEN MUSCLE RELAXATION AND THE ENVIRONMENTAL ELECTROLYTES,
AD-438 684 DIV. 14

HEAT
DIFFUSION
TURBULENT DIFFUSION OF HEAT AND MOMENTUM IN A HOMOGENEOUS AND ISOTROPIC TURBULENT STREAM,
AD-439 507 DIV. 9

HEAT EXCHANGERS
HEAT TRANSFER
EXPERIMENTAL STUDY OF CONTACT HEAT EXCHANGE,
AD-439 961 DIV. 13
HEAT SHIELD CONCEPTS AND MATERIALS FOR REENTRY VEHICLES,
AD-439 449 DIV. 14

HEAT TRANSFER
CONVECTION
EXPERIMENTAL INVESTIGATION OF THE EFFECTS ON HEAT EXCHANGE OF THE CONFIGURATION OF A BODY AND OF THE INCIDENT ANGLE OF AN AIR CURRENT,
AD-439 229 DIV. 25

HEAT TRANSFER
MEASUREMENT
SITTING TIME AND STRAIN EFFECTS IN A .00005 INCH DIAMETER COLD WIRE FOR LOW DENSITY SHOCK TUBE USE,
AD-438 480 DIV. 9

HEAT-RESISTANT PLASTICS
PLASTIC COATINGS
THE DEVELOPMENT AND EVALUATION OF HEAT-RESISTANT, RAIN-EROSION-RESISTANT COATINGS,
AD-439 442 DIV. 14

HELICOPTERS
TELEVISION DISPLAY SYSTEMS
JANAIR JOINT ARMY-NAVY AIRCRAFT INSTRUMENTATION RESEARCH, TELEVISION AS AN AID TO HELICOPTER FLIGHT,
AD-437 975 DIV. 1

HELIUM
HYPERFINE STRUCTURE
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM,
AD-439 695 DIV. 25

HEMOGLOBIN
CHEMICAL PROPERTIES
STUDIES ON THE HEMOGLOBIN-OXYGEN EQUILIBRIUM,
AD-439 020 DIV. 14

HEPATITIS VIRUSES
ELECTRON MICROSCOPY
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS,
AD-439 028 DIV. 14

HEPATITIS (NONVIRAL)
ELECTRON MICROSCOPY
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS,
AD-438 694 DIV. 14
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS,
AD-438 695 DIV. 14

HIGH SPEED PHOTOGRAPHY
ELECTROPHOTOGRAPHY
DEVELOPMENT OF A CAMERA-SPEED XEROGRAPHIC PLATE,
AD-439 728 DIV. 24

HIGH-TEMPERATURE RESEARCH
MEASUREMENT
TEMPERATURE MEASUREMENTS FOR SHOCK HEATED POWDERED SOLIDS,
AD-438 259 DIV. 25

HOISTS
FEASIBILITY STUDIES
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH AND DEVELOPMENT STATION (FORDS). PHASE 1A,
AD-438 814 DIV. 31

HOMEOSTASIS
CENTRAL NERVOUS SYSTEM
RESEARCH ON BRAIN STEM MECHANISMS REGULATING AUTONOMIC ACTIVITIES,
AD-438 640 DIV. 14

HONEYCOMB CORES
DESIGN
DEVELOPMENT AND EVALUATION OF A LIGHTWEIGHT ALUMINUM HONEYCOMB CASE,
AD-439 657 DIV. 26

HORMONES
THYROID GLAND
EFFECT OF NEUROHYPOPHYSIAL HORMONE ON THYROID ACTIVITY,
AD-439 055 DIV. 14
ON THE EFFECT OF NEUROHYPOPHYSIAL HORMONE ON THYROID ACTIVITY,
AD-439 060 DIV. 14

HORN ANTENNAS
SHOCK (MECHANICS)
SHOCK TUBE TEST OF A HORN ANTENNA,
AD-439 833 DIV. 8

HOT ENVIRONMENT
STRESS (PHYSIOLOGY)
THE HUMAN THERMAL ENVIRONMENT IN A WET TROPICAL AREA (OPERATION SWAMP FOX II),
AD-437 923 DIV. 14

HUMAN ENGINEERING
FIREFIGHTING VEHICLES
A SURVEY OF HUMAN FACTORS ENGINEERING PROBLEMS IN FIREFIGHTING EQUIPMENT,
AD-438 209 DIV. 28

HUMAN ENGINEERING
PERCEPTION
SHORT-TERM MEMORY: NON-EQUIVALENCE OF QUERY AND MESSAGE ITEMS,
AD-437 917 DIV. 28

HYDRIDES
ALUMINUM COMPOUNDS
UNCLASSIFIED ANNOTATED BIBLIOGRAPHY RELATING TO THE SYNTHESIS AND PHYSICAL PROPERTIES OF ALUMINUM HYDRIDE AND CLOSELY RELATED COMPOUNDS,
AD-439 293 DIV. 4
A STUDY OF RAPID SOLIDIFICATION OF HYDROCARBON FUELS,
AD-439 722 DIV. 10

HYDROGEN
FUEL CELLS
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL,
AD-439 670 DIV. 7

HYDROJET ENGINES
DESIGN
A METHOD FOR THE DESIGN OF PUMPJETS,
AD-439 631 DIV. 9

HYDROPHONES
DESIGN
DIRECTIONAL, SPECTRAL, AND STATISTICAL PROPERTIES OF THE UNDER-ICE NOISE IN THE ARCTIC,
AD-439 416 DIV. 2

HYDROPHONES
SCIENTIFIC RESEARCH
HYDROPHONE DEVELOPMENT AT HUDSON LABORATORIES,
AD-437 903 DIV. 6

HYPERFINE STRUCTURE
RELAXATION TIME
DETERMINATION OF HYPERFINE INTERACTIONS IN SOLIDS BY THE USE OF RADIOACTIVE NUCLEI,
AD-438 046 DIV. 20

HYPERSONIC FLOW
PARTIAL DIFFERENTIAL EQUATIONS
SOLVING NUMERICALLY THE NAVIER-STOK EQUATIONS,
AD-439 220 DIV. 9

HYPERSONIC WIND TUNNELS
TEMPERATURE SENSITIVE ELEMENTS
THE EQUILIBRIUM TEMPERATURE PROBE, A DEVICE FOR MEASURING TEMPERATURES IN HYPERSONIC BOUNDARY LAYERS,
AD-439 624 DIV. 30

HYPERVELOCITY PROJECTILES
IMPACT SHOCK
ATTENUATION OF THE STRONG PLANE SHOCK PRODUCED IN A SOLID BY HYPERVELOCITY IMPACT,
AD-439 665 DIV. 22

HYPERVELOCITY PROJECTILES
TERMINAL BALLISTICS
OBSERVATIONS OF HYPERVELOCITY IMPACT OF TRANSPARENT PLASTIC TARGETS,
AD-438 947 DIV. 22

IDENTIFICATION
TEST METHODS
MATERIAL IDENTIFICATION (SORTING),
AD-439 601 DIV. 14

IMMUNITY
INFECTIOUS DISEASES
ON THE DEFENCE MECHANISMS AGAINST INFECTION
AD-438 466 DIV. 14

IMPURITIES
MONITORS
EPITAXIAL CONTROL SYSTEM,
AD-437 938 DIV. 30

INCENDIARY MIXTURES
GUERRILLA WARFARE
IMPROVISED PYROTECHNIC MIXTURES FOR GUERRILLA WARFARE APPLICATIONS
AD-438 782 DIV. 3

INCOMPRESSIBLE FLOW
CYLINDRICAL BODIES
ASYMMETRIC INVISCID MODES OF INSTABILITY FOR SPIRAL FLOW BETWEEN TWO CONCENTRIC ROTATING CYLINDERS,
AD-439 526 DIV. 9

INDEXES
RADIATION EFFECTS
ABSTRACT NO. 23419 TO 23508, PART I,
AD-439 340 DIV. 32
MONTHLY ACCESSION LIST, COORDINATE INDEX, PART II, ACCESSION LISTS FROM OCTOBER 1, 1963 TO APRIL 30 1964,
AD-439 355 DIV. 32

INDONESIA
MILITARY GOVERNMENT
THE ROLE OF THE INDONESIAN ARMY IN POLITICS,
AD-438 920 DIV. 32

INDUSTRIAL PRODUCTION
MANAGEMENT CONTROL SYSTEMS
PROCESS LINE ANALYSIS BY NETWORKS, A TECHNIQUE FOR BALANCING AND CONTROLLING THE PROGRESS OF A MANAGEMENT OR INDUSTRIAL PROCESS,
AD-438 786 DIV. 26

INFECTIONS
BACTERIOPHAGES
GENETIC ANALYSIS OF MICROORGANISM BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIAL DNA,
AD-439 066 DIV. 14

INFECTIONS
INTESTINES
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS,
AD-438 197 DIV. 14
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTION,
AD-438 198 DIV. 14

NON-LINEAR EFFECTS UTILIZING FERROMAGNETIC MATERIALS,
AD-438 185 DIV. 8

FIBERS
QUARTZ
SILICA FIBER FORMING AND CORE SHEATH COMPOSITE FIBER DEVELOPMENT,
AD-438 145 DIV. 14

FIBERS
REINFORCING MATERIALS
FIBER-REINFORCED METALS AND ALLOYS,
AD-438 921 DIV. 17

FILAMENT
OPTIMIZATION
BIAXIAL HYDROSTATIC COMPRESSION TESTING OF STIFFENED AND UNSTIFFENED CYLINDERS: OPTIMUM FILAMENT DIAMETER,
AD-439 655 DIV. 26

FILAMENT WOUND CONSTRUCTION
PRESSURE VESSELS
THE STRENGTH OF GLASS FIBERS AND THE FAILURE OF FILAMENT WOUND PRESSURE VESSELS,
AD-439 217 DIV. 14

FILMS
ELECTROFORMING
THE FORMATION OF THIN ANODIC FILMS OF SILVER OXIDE,
AD-438 188 DIV. 4

FIREFIGHTING VEHICLES
HUMAN ENGINEERING
A SURVEY OF HUMAN FACTORS ENGINEERING PROBLEMS IN FIREFIGHTING EQUIPMENT,
AD-438 209 DIV. 28

FISSION NEUTRONS
AIR
PENETRATION OF NEUTRONS FROM A POINT FISSION SOURCE IN AIR: MOMENTS METHOD CALCULATION,
AD-439 583 DIV. 20

FITTINGS
BRAZING
APPLIED RESEARCH AND DEVELOPMENT WORK ON FAMILIES OF BRAZED AND WELDED FITTINGS FOR ROCKET PROPULSION FLUID SYSTEMS,
AD-438 225 DIV. 27

FLAMES
INHIBITION
MECHANISM STUDIES ON THE CHEMICAL INHIBITION OF FLAMES,
AD-439 644 DIV. 10

FLAT PLATE MODELS
FLUTTER
COMPARATIVE EXPERIMENTAL AND THEORETICAL STUDIES OF THE FLUTTER OF FLAT PANELS IN A LOW SUPERSONIC FLOW,
AD-438 785 DIV. 9

FLAT PLATE MODELS
FRICTION
CALCULATING THE FRICTION RESISTANCE OF A FLAT PLATE AT A ZERO ANGLE OF ATTACK IN THE REGION BETWEEN CONTINUUM AND A FREE-MOLECULAR FLOW,
AD-439 616 DIV. 9

FLOATS
OCEANOGRAPHIC EQUIPMENT
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH + DEVELOPMENT STATION (FORDS). VOLUME I,
AD-438 811 DIV. 31
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH AND DEVELOPMENT STATION (FORDS). VOLUME III,
AD-438 813 DIV. 31

FLOATS
STRUCTURES
FEASIBILITY STUDY OF A FLOATING OCEAN RESEARCH AND DEVELOPMENT STATION (FORDS). PHASE IA,
AD-438 814 DIV. 31

FLUID DYNAMIC PROPERTIES
DRAG
A FORTRAN PROGRAM FOR THE CALCULATION OF THE EQUILIBRIUM CONFIGURATION OF A FLEXIBLE CABLE IN A UNIFORM STREAM,
AD-438 421 DIV. 9

FLUID FLOW
CAVITATION
VOID FRACTION MEASUREMENTS IN CAVITATING MERCURY,
AD-438 262 DIV. 9

FLUIDS
VIBRATION ISOLATORS
DEVELOPMENT OF AUTOMATICALLY HARDENING SHOCK MOUNTS,
AD-438 143 DIV. 31

FLUORESCENCE
AMMONIA
FLASH PHOTOLYSIS AND FLUORESCENCE OF NH3 IN THE VACUUM ULTRAVIOLET,
AD-438 411 DIV. 4

FLUORESCENCE
PHOTOLYSIS
PHOTODISSOCIATION AND FLUORESCENCE IN THE SCHUMANN-UV,
AD-438 456 DIV. 4

FLUORINE COMPOUNDS
FREE RADICALS
INVESTIGATION OF THE DISSOCIATION CHEMISTRY OF -NF2 COMPOUNDS,
AD-439 527 DIV. 4

FLUORINE COMPOUNDS
SYNTHESIS (CHEMISTRY)
LINEAR POLYFLUORINATED ANALAGOUSL BIFUNCTIONAL COMPOUNDS AS POTENTIAL MONOMERS,
AD-437 962 DIV. 4
NITROSO RUBBER RESEARCH, DEVELOPMENT AND PRODUCTION,
AD-439 696 DIV. 14
BRIEF DISCUSSION OF RESEARCH IN FLUORINE CHEMISTRY,
AD-439 658 DIV. 4

FLUTTER SIMULATORS
SUPERSONIC FLOW
COMPARATIVE EXPERIMENTAL AND THEORETICAL STUDIES OF THE FLUTTER OF FLAT PANELS IN A LOW SUPERSONIC FLOW,
AD-438 785 DIV. 9

FOOD
ALGAE
CHEMICAL COMPOSITION AND APPLICABILITY AS FOOD AND FEED OF MASS-CULTURED UNICELLULAR ALGAE,
AD-438 656 DIV. 16

FOOD
BIOCHEMISTRY
THE BIOCHEMICAL BASES FOR DEVELOPING PRODUCTS OF HIGHER BIOLOGICAL VALUE,
AD-438 226 DIV. 16

FRACTURE (MECHANICS)
TOUGHNESS
PROPERTIES OF ULTRA-HIGH STRENGTH BAINITIC STRUCTURES,
AD-439 842 DIV. 17

FREE RADICALS
FLUORINE COMPOUNDS
INVESTIGATION OF THE DISSOCIATION CHEMISTRY OF -NF2 COMPOUNDS,
AD-439 527 DIV. 4

FREE RADICALS
HYPERFINE STRUCTURE
RESEARCH DIRECTED TOWARD THE STUDY OF THE STRUCTURAL AND ULTRAVIOLET SPECTRA OF FREE RADICALS, MOLECULES AND MOLECULAR IONS USING THEORETICAL AND COMPUTATIONAL METHODS,
AD-437 952 DIV. 25

FREQUENCY CONVERTERS
PRODUCTION
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND, AND X-BAND,
AD-439 645 DIV. 8

FUEL ADDITIVES
HYDROCARBONS
A STUDY OF RAPID SOLIDIFICATION OF HYDROCARBON FUELS,
AD-439 722 DIV. 10

FUEL CELLS
DESIGN
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL,
AD-439 670 DIV. 7

FUEL CELLS
LIQUID METALS
RESEARCH AND DEVELOPMENT OF AN ADVANCED LABORATORY LIQUID METAL REGENERATIVE FUEL CELL,
AD-438 519 DIV. 7

FUELS
SOLIDS
A STUDY OF RAPID SOLIDIFICATION OF HYDROCARBON FUELS,
AD-439 722 DIV. 10

FUNGI
KWAJALEIN ATOLL
MICROFLORA AT KWAJALEIN ISLAND,
AD-439 206 DIV. 14

GAME THEORY
INFORMATION THEORY
A METHOD FOR IMPROVING COMPREHENSION OF TECHNICAL COMMUNICATIONS THROUGH STATISTICAL TESTING AND INFORMATION RETRIEVAL PROCEDURES,
AD-438 662 DIV. 30

GAMMA EMISSION
COBALT
RADIATION EFFECTS PARAMETERS IN NAP APPLICATIONS,
AD-439 684 DIV. 20

GAMMA-RAY SCATTERING
MONTE CARLO METHOD
MONTE CARLO COMPUTATION OF 100,000 1 MEV GAMMA RAYS SCATTERED BY CONCRETE SLABS,
AD-438 908 DIV. 20

GAS ANALYSIS
EPITAXIAL GROWTH
EPITAXIAL CONTROL SYSTEM,
AD-439 938 DIV. 30

GAS DISCHARGES
MICROWAVE EQUIPMENT
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS,
AD-438 865 DIV. 29

GASES
MICROWAVE EQUIPMENT
DIELECTRIC GASES: REDUCTION OF LEAKAGE COSTS IN HIGH POWER MICROWAVE SYSTEMS,
AD-438 052 DIV. 8

GASTROINTESTINAL SYSTEM
INFECTIOUS DISEASES
THE STUDY ON THE PATHOGENESIS OF INTESTINAL INFECTIONS,
AD-438 459 DIV. 16

GENETICS
METABOLISM
BIOCHEMICAL AND GENETICAL STUDIES OF INH METABOLISM,
AD-439 297 DIV. 16

GEOMETRIC FORMS
HEAT TRANSFER
EXPERIMENTAL INVESTIGATION OF THE EFFECTS ON HEAT EXCHANGE OF THE CONFIGURATION OF A BODY AND OF THE INCIDENT ANGLE OF AN AIR CURRENT,
AD-439 229 DIV. 28

GEOMETRY
ALGEBRAS
ON SET FUNCTIONALS THAT PRESERVE A GIVEN GEOMETRY CLASS,
AD-438 433 DIV. 18

GERMICIDES
QUINOLINES
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS,
AD-438 542 DIV. 16

GLASS TEXTILES
STIFFENED CYLINDERS
BIAXIAL HYDROSTATIC COMPRESSION TESTING OF STIFFENED AND UNSTIFFENED CYLINDERS: OPTIMUM FILAMENT DIAMETER,
AD-439 655 DIV. 26

GLASS TEXTILES
TENSILE PROPERTIES
THE STRENGTH OF GLASS FIBERS AND THE FAILURE OF FILAMENT WOUND PRESSURE VESSELS,
AD-439 217 DIV. 14

GLASS TEXTILES
THERMAL INSULATION
''K'' FACTOR DETERMINATION OF FOUR TYPES OF PANEL CONSTRUCTION IN F-111 AIRPLANE,
AD-438 470 DIV. 14

GRAPHITE
PHYSICAL PROPERTIES
THE DETERMINATION OF DESIGN CRITERIA FOR GRADE CFZ GRAPHITE,
AD-438 206 DIV. 14

GRAVITY
THEORY
THE SCHWARZSCHILD METRIC AND WHITEHEAD THEORY OF GRAVITATION,
AD-438 883 DIV. 28

GROUND POSITION INDICATORS
DISPLAY SYSTEMS
RHO/RHO COMPUTER DISPLAY,
AD-438 175 DIV. 1

GROUND SUPPORT EQUIPMENT
ANTENNAS
DETAILED TEST REQUIREMENTS FOR WS-133B MINUTEMAN GROUND ELECTRONICS SYSTEM FIGURE A 14131, ANTENNA FILTER SET AN/GRA-79 EVALUATION TEST PROGRAM,
AD-438 030 DIV. 12

GROUND SUPPORT EQUIPMENT
INPUT-OUTPUT DEVICES
WS-133B MINUTEMAN GROUND ELECTRONICS SYSTEM FIGURE A 14124, MESSAGE BUFFER UNIT MU-503/GRC128, DETAILED TEST REQUIREMENTS FOR EVALUATION TEST PROGRAM,
AD-438 205 DIV. 12

GROUP DYNAMICS
BEHAVIOR
STRUCTURAL FACTORS AND INDIVIDUAL NEEDS IN GROUP BEHAVIOR,
AD-438 513 DIV. 28

GROUP DYNAMICS
CIVIL DEFENSE SYSTEMS
THE USE OF VOLUNTARY ORGANIZATIONS IN CIVILIAN DEFENSE AND PREPAREDNESS,
AD-439 612 DIV. 18

GROUP DYNAMICS
SENSORY DEPRIVATION
PIONEER VI, CONFORMITY TO A GROUP NORM AS A FUNCTION OF SENSORY DEPRIVATION AND SOCIAL ISOLATION,
AD-439 430 DIV. 28

GROUP DYNAMICS
TRAINING
A COMPARISON OF MODES OF PRESENTATION OF PAIREDASSOCIATES ON THE SUBJECT-MATTER TRAINER,
AD-439 648 DIV. 23

LAMINAR BOUNDARY LAYER
HYPERSONIC FLOW
SIMILAR SOLUTIONS FOR THE HYPERSONIC LAMINAR BOUNDARY LAYER NEAR A PLANE OF SYMMETRY,
AD-438 832 DIV. 9

LASERS
ABSORPTION
NON-LINEAR INTERACTIONS OF ELECTROMAGNETIC FIELDS WITH MATTER,
AD-439 435 DIV. 25

LASERS
CRYSTALS
CRYSTALS FOR OPTICAL MASER APPLICATIONS,
AD-438 422 DIV. 25

LASERS
FLUORESCENCE
FLUORESCENCE PUMPING OF LASERS,
AD-439 453 DIV. 25

LASERS
SCIENTIFIC RESEARCH
SOLID STATE LASER EXPLORATIONS,
AD-438 170 DIV. 25

LAUNCH VEHICLES (AEROSPACE)
METEOROLOGICAL PARAMETERS
THE EFFECTS OF THE ACCURACY OF ATMOSPHERE DATA ON THE STRUCTURAL DESIGN LOADS OF A TYPICAL LAUNCH VEHICLE,
AD-437 972 DIV. 13
APPLICATION OF MOBILE DRYDOCK LAUNCH SYSTEM TO SPACE MISSIONS, VOLUME I SUMMARY,
AD-439 718 DIV. 12

LEGS
SURGERY
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG,
AD-439 021 DIV. 14

LENS ANTENNAS
HIGH FREQUENCY
DEVELOPMENT AND TESTING OF HF WIRE-GRID LENS ANTENNA, VOLUME I,
AD-439 808 DIV. 8

LEUKOCYTES
BIOLOGICAL PRODUCTS
ON THE DEFENCE MECHANISMS AGAINST INFECTION
AD-438 966 DIV. 14

LIGHT
MODULATION
ORTHOGONAL ULTRASONIC SIGNALS,
AD-438 036 DIV. 6

LIMITED WAR
AIRCRAFT
A PARAMETRIC STUDY OF THE DELIVERY UNDER RISK PROBLEM AS IT APPLIES TO INTERDICTION COST EFFECTIVENESS,
AD-439 499 DIV. 19

LIMITERS
BROADBAND
BROADBAND MICROWAVE POWER LIMITERS,
AD-439 236 DIV. 8

LINEAR SYSTEMS
STATISTICAL TESTS
ON A CLASS OF TESTING PROCEDURES IN LINEAR MODELS,
AD-437 983 DIV. 15

LIQUID METALS
FUEL CELLS
RESEARCH AND DEVELOPMENT OF AN ADVANCED LABORATORY LIQUID METAL REGENERATIVE FUEL CELL,
AD-438 519 DIV. 7

LIQUID METALS
HEATING
LIQUID METAL-HEATED SPACE RADIATOR-MOUNTED THERMIONIC GENERATOR,
AD-437 926 DIV. 7

LIQUID ROCKET PROPELLANTS
CONTAMINATION
RESEARCH ON NEW TECHNIQUES FOR ANALYSIS OF CONTAMINANTS IN LIQUID PROPELLANTS,
AD-437 979 DIV. 10

LIQUIDS
ENERGY
A NOTE ON THE ONSET OF CONVECTION IN A SELF-GRAVITATING SPHERE,
AD-439 525 DIV. 25

LIVER
ELECTRON MICROSCOPY
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS,
AD-438 693 DIV. 14

LIVER
INFECTIOUS HEPATITIS
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS,
AD-439 027 DIV. 14

LIVER
NEOPLASMS
STUDIES ON THE CHROMOSOMAL DIFFERENCES AMONG VARIOUS ASCITES HEPATOMAS OF RATS,
AD-438 653 DIV. 14
STUDIES ON THE CHROMOSOMAL DIFFERENCES AMONG VARIOUS ASCITES HEPATOMAS OF RATS,
AD-438 654 DIV. 14

LIVER
PATHOLOGY
CELL DAMAGE IN LIVER AND KIDNEYS AS REVEALED BY LIGHT AND ELECTRON MICROSCOPY,
AD-438 534 DIV. 16
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS,
AD-439 053 DIV. 14

LIVER
REGENERATION
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM,
AD-438 682 DIV. 14

LOGISTICS
SPACE FLIGHT
SOME SELECT PHYSIOLOGICAL, ANTHROPOMETRIC, AND HUMAN ENGINEERING DATA USEFUL IN VEHICLE DESIGN AND LOGISTIC PROBLEMS OF SPACE FLIGHT OPERATIONS,
AD-438 231 DIV. 14

LOG-PERIODIC ANTENNAS
PHASE (ELECTRONICS)
MEASUREMENT OF THE PHASE CENTERS OF ANTENNAS,
AD-439 425 DIV. 8

LORAN
NAVIGATION CHARTS
NEW TECHNIQUES FOR COMPUTING LORAN MAPS,
AD-438 991 DIV. 19

LUBRICANTS
FILMS
EFFECTS OF IRRADIATION AT THREE FLUX LEVELS IN THE GROUND TEST REACTION ON THE WEARLIFE OF SOLID FILM LUBRICANTS,
AD-438 132 DIV. 14
EFFECTS OF IRRADIATION AND HIGH TEMPERATURE ON WEAR LIFE OF 3 CERAMIC BONDED SOLID FILM LUBRICANTS,
AD-438 137 DIV. 14

LUBRICANTS
RESEARCH PROGRAM ADMINISTRATION
AEROSPACE LUBRICATION RESEARCH SURVEY,
AD-439 678 DIV. 14

LUBRICATION
ROLLER BEARINGS
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS,
AD-439 606 DIV. 24

LUBRICATION
SPACE ENVIRONMENTAL CONDITIONS
AEROSPACE LUBRICATION RESEARCH SURVEY,
AD-439 678 DIV. 14

LUMINESCENCE
NIGHT SKY
REPRINT OF IRISH PAPER ON CHEMICAL REACTIONS CONTRIBUTING TO NIGHTGLOW,
AD-439 651 DIV. 2

LUNAR BASES
POWER EQUIPMENT
ENGINEERING STUDY OF MULTIPURPOSE ENGINE AND FUEL SYSTEM FOR MANNED LUNAR BASES,
AD-439 835 DIV. 7

MACHINES
NOISE
GUIDE FOR STRUCTUREBORNE MACHINERY NOISE MEASUREMENTS,
AD-439 291 DIV. 31

MAGNETIC FIELDS
MEASUREMENT
ELF INVESTIGATIONS,
AD-439 090 DIV. 30

MAGNETISM
THEORY
NORMAL SPIN-WAVE MODES OF COMPLEX EXCHANGE COUPLED CRYSTALS,
AD-437 955 DIV. 25

MAGNETOHYDRODYNAMICS
MOTION
STEADY AND UNSTEADY MOTION IN MAGNETO-FLUID DYNAMICS,
AD-438 560 DIV. 25

MAGNETOHYDRODYNAMICS
SHOCK WAVES
A MAGNETIC COMPRESSION EXPERIMENT FOR THE STUDY OF SHOCK WAVE STRUCTURES,
AD-437 991 DIV. 25

MAGNETRONS
EXTREMELY HIGH FREQUENCY
BL-221 70 GC MAGNETRON PRODUCTION ENGINEERING MEASURE,
AD-439 585 DIV. 8

MAGNETRONS
K BAND
PRODUCTION ENGINEERING MEASURE FOR A KA-BAND INVERTED COAXIAL MAGNETRON,
AD-438 867 DIV. 8

MAINTENANCE
ENGINEERING
SYSTEMS RELIABILITY ENGINEERING GRADUATE CURRICULUM,
AD-438 173 DIV. 29

MAINTENANCE
NAVAL PERSONNEL
TRAINING, UTILIZATION, AND PROFICIENCY OF NAVY ELECTRONICS TECHNICIANS, V. WORK DIARIES,
AD-438 215 DIV. 26

MAINTENANCE
TRAINING
IMPLEMENTATION AND CHECKOUT OF THE FORECAST CONCEPT OF ELECTRONIC SYSTEM REPAIR AT THE U.S. ARMY ORDNANCE GUIDED MISSILE SCHOOL,
AD-438 010 DIV. 8

MAINTENANCE PERSONNEL
PERFORMANCE TESTS
BIBLIOGRAPHY ON MAINTENANCE PERSONNEL PERFORMANCE MEASUREMENT,
AD-439 610 DIV. 29

MANAGEMENT ENGINEERING
DATA PROCESSING SYSTEMS
FUTURE TRENDS IN AIR FORCE DATA SYSTEMS,
AD-439 333 DIV. 30

MANAGEMENT ENGINEERING
PRODUCTION CONTROL
PROCESS LINE ANALYSIS BY NETWORKS, A TECHNIQUE FOR BALANCING AND CONTROLLING THE PROGRESS OF A MANAGEMENT OR INDUSTRIAL PROCESS,
AD-438 786 DIV. 26

MANNED SPACECRAFT
AIR TRANSPORTATION
A STUDY OF AN ORBITAL MAINTENANCE AND MATERIAL TRANSFER SHUTTLE,
AD-438 517 DIV. 12

MANNED SPACECRAFT
ATTITUDE CONTROL SYSTEMS
APPLICATION OF HIGH MOMENT-PRODUCING TECHNIQUES FOR CONTROL OF A MANNED SPACE VEHICLE,
AD-439 201 DIV. 12
APPLICATION OF HIGH MOMENT-PRODUCING TECHNIQUES FOR CONTROL OF A MANNED SPACE VEHICLE,
AD-439 202 DIV. 12

MANNED SPACECRAFT
DESIGN
DEVELOPMENT PLAN AND COST ESTIMATE, ADDENDUM TO A STUDY OF AN ORBITAL MAINTENANCE AND MATERIAL TRANSFER SHUTTLE,
AD-438 028 DIV. 12

MANNED SPACECRAFT
MODELS (SIMULATIONS)
AEROSPACE ENVIRONMENT SIMULATOR,
AD-438 047 DIV. 14

MANUFACTURING METHODS
ROCKET CASES
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE, VOLUME IV, FABRICATION AND TESTING OF FULL SCALE COMPONENTS,
AD-438 714 DIV. 27

MANUFACTURING METHODS
TRANSISTORS
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N328A TRANSISTOR,
AD-439 408 DIV. 26
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS,
AD-439 694 DIV. 8

MAPPING (TRANSFORMATIONS)
SET THEORY
ON SET FUNCTIONALS THAT PRESERVE A GIVEN GEOMETRY CLASS,
AD-438 433 DIV. 19

MARKERS
MATERIALS
INVESTIGATION OF THE BURNING CHARACTERISTICS OF THE LEAD DIOXIDE-CUPRIC OXIDE-SILICON STARTER COMPOSITION,
AD-437 978 DIV. 3

MASERS
HYPERFINE STRUCTURE
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM,
AD-439 695 DIV. 25

MASERS
SCIENTIFIC RESEARCH
SOLID STATE PHYSICS,
AD-439 686 DIV. 25

MASERS
SOLID STATE PHYSICS
STUDY OF SOLID-STATE AND TRAVELING-WAVE MASER TECHNIQUES,
AD-437 906 DIV. 25

MASS SPECTROSCOPY
NITROGEN
MASS-SPECTROMETRIC INVESTIGATION OF THE PHOTOIONIZATION OF THE NITROGEN MOLECULE,
AD-438 412 DIV. 4

THE STUDY ON THE PATHOGENESIS
OF INTESTINAL INFECTIONS.
AD-438 199 DIV. 16

INFECTIOUS DISEASES
GASTROINTESTINAL SYSTEM
THE STUDY ON THE PATHOGENESIS
OF INTESTINAL INFECTIONS.
AD-438 458 DIV. 16
THE STUDY ON THE PATHOGENESIS
OF INTESTINAL INFECTIONS.
AD-438 459 DIV. 16

INFECTIOUS DISEASES
INTESTINES
THE STUDY ON THE PATHOGENESIS
OF INTESTINAL INFECTIONS.
AD-438 461 DIV. 16

INFECTIOUS HEPATITIS
ELECTRON MICROSCOPY
ELECTRON MICROSCOPE STUDY
ON THE INFECTIOUS HEPATITIS.
AD-439 026 DIV. 16

INFECTIOUS HEPATITIS
LIVER
ELECTRON MICROSCOPE STUDY
ON THE INFECTIOUS HEPATITIS.
AD-439 027 DIV. 16

INFECTIOUS HEPATITIS
PATHOLOGY
ELECTRON MICROSCOPE STUDY
ON THE INFECTIOUS HEPATITIS.
AD-438 693 DIV. 16

INFORMATION RETRIEVAL
REPORTS
A METHOD FOR IMPROVING COMPREHEN-
SION OF TECHNICAL COMMUNICATIONS
THROUGH STATISTICAL TESTING
AND INFORMATION RETRIEVAL
PROCEDURES.
AD-438 662 DIV. 30

INFORMATION RETRIEVAL
THEORY
AN INVESTIGATION OF THE TECHNIQUES
AND CONCEPTS OF INFORMATION
RETRIEVAL.
AD-437 924 DIV. 30

INFRARED DETECTORS
PHOTOELECYRIC CELLS (SEMICONDUCTOR)
PRODUCTION ENGINEERING
MEASURE PBSE INFRARED
DETECTORS - TYPE IR-200.
AD-439 410 DIV. 6

INFRARED RADIATION
MEASUREMENT
RESULTS OF OBSERVATIONS ON
ATMOSPHERIC OZONE BY THE
INFRARED METHOD, DEDUCED
FROM DATA OBTAINED IN AROSA
(SWITZERLAND).
AD-439 212 DIV. 2

INFRARED TRACKING
SATELLITES (ARTIFICIAL)
RESEARCH ON THE DETECTION
OF INFRARED EMISSION FROM
SATELLITE VEHICLES.
AD-438 723 DIV. 6

INSECTS
CENTRAL AMERICA
MOSQUITOES OF MIDDLE AMERICA.
AD-438 886 DIV. 16

INSTRUCTION MANUALS
RADIOACTIVITY
RADIOLOGICAL SAFETY MANUAL.
AD-438 147 DIV. 20

INTEGRAL EQUATIONS
NUMERICAL ANALYSIS
NUMERICAL TREATMENT OF AN
INTEGRAL EQUATION ARISING
IN A MIXED-BOUNDARY ELASTICITY
PROBLEM.
AD-437 920 DIV. 18

INTEGRALS
FUNCTIONS
RATIONAL APPROXIMATIONS FOR
THE INCOMPLETE GAMMA FUNCTION.
AD-439 017 DIV. 18

INTERFERENCE ANALYZERS
RADIOFREQUENCY INTERFERENCE
RADIO INTERFERENCE MEASURING
SET AN/TRM-6(XA-3).
AD-437 907 DIV. 30

INTERIOR BALLISTICS
PROGRAMMING (COMPUTERS)
A DIGITAL COMPUTER PROGRAM
FOR HIRSCHFELDER INTERIOR
BALLISTICS.
AD-439 225 DIV. 22

INTERNAL COMBUSTION ENGINE NOISE
PISTONS
PISTON-SLAP NOISE IN RECIPROCATING
MACHINERY.
AD-439 205 DIV. 27

INTERNAL COMBUSTION ENGINES
DESIGN
A STRATIFIED CHARGE TWO-STROKE
SPARK IGNITION ENGINE (RAM
STRATICHARGE, VEE-4, 108.6
IN3 DISP.) PERFORMANCE
CHARACTERISTICS.
AD-439 681 DIV. 27

INTESTINES
INFECTIONS
THE STUDY ON THE PATHOGENESIS
OF INTESTINAL INFECTIONS.
AD-438 197 DIV. 16
THE STUDY ON THE PATHOGENESIS
OF INTESTINAL INFECTION.
AD-438 198 DIV. 16
THE STUDY ON THE PATHOGENESIS
OF INTESTINAL INFECTIONS.
AD-438 199 DIV. 16

INTESTINES
INFECTIOUS DISEASES
THE STUDY ON THE PATHOGENESIS
OF INTESTINAL INFECTIONS.
AD-438 460 DIV. 16

INTESTINES
PATHOLOGY
THE STUDY ON THE PATHOGENESIS
OF INTESTINAL INFECTIONS.
AD-438 461 DIV. 16

ION BEAMS
MAGNETIC FIELDS
NEUTRALIZATION OF AN ION
BEAM WITH ELECTRONS IN A
MAGNETIC FIELD.
AD-438 227 DIV. 25

IONOSPHERIC DISTURBANCES
DIFFRACTION
AN APPROXIMATE METHOD FOR
COMPUTING DIFFRACTION PATTERNS
CAUSED BY IONOSPHERIC IRREGULARITIES.
AD-437 981 DIV. 8

IONOSPHERIC PROPAGATION
ATTENUATION
THE EFFECT OF IONS ON LF
AND VLF PROPAGATION IN AN
ABNORMALLY IONIZED ATMOSPHERE.
AD-439 615 DIV. 8

IONOSPHERIC PROPAGATION
DIFFRACTION
AN APPROXIMATE METHOD FOR
COMPUTING DIFFRACTION PATTERNS
CAUSED BY IONOSPHERIC IRREGULARITIES.
AD-437 981 DIV. 8

IONOSPHERIC PROPAGATION
NUCLEAR EXPLOSIONS
A NOTE ON PERSISTING RADIO
PROPAGATION EFFECTS AFTER
HIGH-ALTITUDE NUCLEAR BURSTS.
AD-438 822 DIV. 8

ISOCYANATE PLASTICS
MECHANICAL PROPERTIES
SOLID PROPELLANT MECHANICAL
PROPERTIES INVESTIGATIONS.
AD-439 403 DIV. 10

ISONIAZID
METABOLISM
STUDIES ON ISONIAZID METABOLISM
IN JAPANESE AND ISONIAZID
RESISTANCE.
AD-438 746 DIV. 16
STUDIES ON METABOLISM OF
ISONIAZID.
AD-438 747 DIV. 16

JAPANESE B ENCEPHALITIS VIRUS
ANALYSIS
ANALYSIS OF THE DEVELOPMENT
OF JAPANESE B ENCEPHALITIS
VIRUS WITH THE ELECTRON MICROSCOPE.
AD-439 015 DIV. 16
ANALYSIS OF THE DEVELOPMENT
OF JAPANESE B ENCEPHALITIS
VIRUS WITH THE ELECTRON MICROSCOPE.
AD-439 016 DIV. 16

JAPANESE B ENCEPHALITIS VIRUS
ELECTRON MICROSCOPY
ANALYSIS OF THE DEVELOPMENT
OF JAPANESE B ENCEPHALITIS
VIRUS WITH THE ELECTRON MICROSCOPE.
AD-438 696 DIV. 16
ANALYSIS OF THE DEVELOPMENT
OF JAPANESE B ENCEPHALITIS
VIRUS WITH THE ELECTRON MICROSCOPE.
AD-438 697 DIV. 16
ANALYSIS OF THE DEVELOPMENT
OF JAPANESE B ENCEPHALITIS
VIRUS WITH THE ELECTRON MICROSCOPE.
AD-438 698 DIV. 16
ANALYSIS OF THE DEVELOPMENT
OF JAPANESE B ENCEPHALITIS
VIRUS WITH THE ELECTRON MICROSCOPE.
AD-439 049 DIV. 16
ANALYSIS OF THE DEVELOPMENT
OF JAPANESE B ENCEPHALITIS
VIRUS WITH THE ELECTRON MICROSCOPE.
AD-439 052 DIV. 16

JAPANESE B ENCEPHALITIS VIRUS
PATHOLOGY
THE EXPLANATION OF PATHOGENESIS
OF JBE VIRUS AND THE ESTABLISHMENT
OF AN ATTENUATED STRAIN OF
JBE VIRUS COMPLETELY AVIRULENT
TO MAN.
AD-439 321 DIV. 16
THE EXPLANATION OF PATHOGENESIS
OF JBE VIRUS AND THE ESTABLISHMENT
OF AN ATTENUATED STRAIN OF
JBE VIRUS COMPLETELY AVIRULENT
TO MAN.
AD-439 322 DIV. 16

JET BOMBERS
BOUNDARY LAYER CONTROL SYSTEMS
LAMINAR FLOW CONTROL DEMONSTRATION
PROGRAM, LFC MANUFACTURING
TECHNIQUES.
AD-439 329 DIV. 26

JET FIGHTERS
PARASITE PLANES
PARASITING VERSUS AERIAL
REFUELING FOR SUPPORT OF
COMBAT AIRCRAFT.
AD-439 093 DIV. 1

JET FIGHTERS
REFUELING IN FLIGHT
PARASITING VERSUS AERIAL
REFUELING FOR SUPPORT OF
COMBAT AIRCRAFT.
AD-439 093 DIV. 1

KETONES
POLYCYCLIC COMPOUNDS
THE SYNTHESIS OF NON-COMMERCIALLY
AVAILABLE ORGANIC COMPOUNDS.
AD-439 402 DIV. 4

KIDNEYS
PATHOLOGY
CELL DAMAGE IN LIVER AND KIDNEYS
AS REVEALED BY LIGHT AND ELECTRON
MICROSCOPY.
AD-438 534 DIV. 16

MICROWAVE OSCILLATORS
TUNNEL DIODES
A 10-MW, X-BAND TUNNEL-DIODE OSCILLATOR,
AD-438 192 DIV. 8

MICROWAVE SPECTROSCOPY
MOLECULAR STRUCTURE
MICROWAVE INVESTIGATION OF MOLECULAR STRUCTURE AND PROPERTIES,
AD-438 043 DIV. 25

MICROWAVE SPECTROSCOPY
RADIO RECEIVERS
ELECTRONIC EQUIPMENT INTERFERENCE CHARACTERISTICS-COMMUNICATION TYPE,
AD-439 503 DIV. 8

MICROWAVES
PROPAGATION
METHOD FOR INCREASED DATA RATE IN TRANSMISSION OVER TIME-VARYING MULTIPLE PATHS,
AD-438 431 DIV. 8

MICROWAVES
SCATTERING
THEORETICAL INVESTIGATIONS OF SCATTERING FROM PLASTIC FOAMS,
AD-437 900 DIV. 8

MICROWAVES
WAVEGUIDES
MICROWAVE INVESTIGATION OF THE DIELECTRIC WAVEGUIDE PROPAGATION BY MAGNETO-IONIC DUCTS,
AD-439 213 DIV. 25

MILITARY COMMUNICATIONS
AUTOMATION
INFORMATION SYSTEMS INTEGRATION,
AD-438 429 DIV. 5

MILITARY COMMUNICATIONS
INFORMATION RETRIEVAL
MILITARY INFORMATION SYSTEMS,
AD-438 430 DIV. 5

MILITARY PERSONNEL
HOT ENVIRONMENT
THE HUMAN THERMAL ENVIRONMENT IN A WET TROPICAL AREA (OPERATION SWAMP FOX III),
AD-437 923 DIV. 16

MILITARY PERSONNEL
JOB ANALYSIS
RATINGS BY OFFICER GROUPS OF IMPORTANCE AND OBTAINABILITY OF SELECTED JOB CHARACTERISTICS,
AD-437 954 DIV. 28

MILITARY STRATEGY
MAINTENANCE
THE EVALUATION OF TROUBLESHOOTING STRATEGIES,
AD-438 924 DIV. 29

MILITARY TRAINING
EDUCATION
YEARS OF EDUCATION AS A PREDICTOR OF TECHNICAL TRAINING SUCCESS,
AD-437 940 DIV. 23

MINIATURE ELECTRONIC EQUIPMENT
DESIGN
STUDY OF MICROCIRCUITRY TECHNIQUES UTILIZING MOLECULAR ENGINEERING,
AD-437 949 DIV. 8

MIRRORS
SPACEBORNE
SOLAR REFLECTOR FOAMING TECHNOLOGY,
AD-439 605 DIV. 25

MODELS (SIMULATIONS)
SPACE ENVIRONMENTAL CONDITIONS
AEROSPACE ENVIRONMENT SIMULATOR,
AD-438 047 DIV. 16

MODULATORS
ELECTRON GUNS
A 550-MEGAWATT PULSE MODULATOR,
AD-439 218 DIV. 8

MODULES (ELECTRONICS)
MICROMINIATURIZATION (ELECTRONICS)
LOW COST ARMY MICROMODULE PROGRAM,
AD-439 237 DIV. 8
LOW COST ARMY MICROMODULE PROGRAM,
AD-439 238 DIV. 8

MODULES (ELECTRONIC)
COOLING
SOLID-STATE COOLING OF FUNCTIONAL ELECTRONIC BLOCKS,
AD-439 203 DIV. 8

MOLECULAR ELECTRONICS
PERFORMANCE (ENGINEERING)
FUNCTIONAL ELECTRONIC BLOCKS MANUFACTURING METHODS PROGRAM, PART II BLOCK EVALUATION PROGRAM,
AD-437 974 DIV. 8

MOLECULAR SPECTROSCOPY
QUANTUM MECHANICS
INSTITUTE FOR MOLECULAR PHYSICS,
AD-438 051 DIV. 25

MOLECULAR SPECTROSCOPY
SOLID STATE PHYSICS
SOLID STATE PHYSICS,
AD-439 686 DIV. 25

MOLECULES
STORAGE
MOLECULAR STORAGE AND TRANSFER OF ELECTROMAGNETIC ENERGY IN GASEOUS PLASMAS,
AD-438 419 DIV. 25

MOLECULES
VIBRATION
THE EFFECTS OF ELECTRONIC EXCHANGE ON THE EFFICIENCY OF VIBRATIONAL EXCITATION BY MOLECULAR COLLISIONS,
AD-439 604 DIV. 25

MOLYBDENUM
OXIDATION
KINETIC AND AERODYNAMIC ASPECTS OF THE OXIDATION OF METALS BY PARTIALLY DISSOCIATED OXYGEN,
AD-438 927 DIV. 4

MOLYBDENUM COMPOUNDS
HARDENING
PEST REACTIONS IN INTERMETALLIC COMPOUNDS, II, INVESTIGATIONS ON NIAL, AND TWO MOSI2 STRUCTURES,
AD-439 216 DIV. 17

MOMENTUM
DIFFUSION
TURBULENT DIFFUSION OF HEAT AND MOMENTUM IN A HOMOGENEOUS AND ISOTROPIC TURBULENT STREAM,
AD-439 307 DIV. 9

MORPHOLOGY (BIOLOGY)
ANTIBIOTICS
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS,
AD-438 543 DIV. 16

MORPHOLOGY (BIOLOGY)
CHROMOSOMES
STUDIES ON THE CHROMOSOMAL DIFFERENCES AMONG VARIOUS ASCITES HEPATOMAS OF RATS,
AD-438 652 DIV. 16

MOTION
STABILITY
ON THE STABILITY OF THE EQUILIBRIUM SOLUTIONS OF THE PLANE RESTRICTED THREE BODY PROBLEM IN THE SENSE OF LIAPOUNOV,
AD-438 857 DIV. 25

MOTION
THERMAL PROPERTIES
X-RAY DIFFRACTION STUDIES OF THERMAL MOTIONS IN CRYSTALS,
AD-439 003 DIV. 25

MOUNTING BRACKETS
BALL BEARINGS
INVESTIGATION OF SELF-ALIGNING BEARING MOUNTINGS FOR SPACE OPERATION,
AD-439 856 DIV. 26

MOUTH
INFECTIONS
CORRELATION BETWEEN SUSCEPTIBILITY TO ORAL INFECTION AND INTESTINAL BACTERIAL FLORA IN THE INBRED MOUSE STRAINS RAISED BY BROTHER SISTER MATINGS IN OUR LABORATORY,
AD-438 692 DIV. 16

MUSCLE
HISTOLOGY
RELATION BETWEEN MUSCLE RELAXATION AND THE ENVIRONMENTAL ELECTROLYTES,
AD-438 684 DIV. 16

MUSCLES
INHIBITION
FACTORS MODIFYING THE ACTION OF NEUROMUSCULAR BLOCKING AGENTS,
AD-439 674 DIV. 16

MUSCLES
NERVE CELLS
NEURAL MECHANISMS FOR RESPONSES OF MIDDLE EAR MUSCLES,
AD-439 381 DIV. 16

MUSCLES
RELAXATION (PHYSIOLOGY)
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT SIMULATION,
AD-438 685 DIV. 16
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION,
AD-439 283 DIV. 16
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION,
AD-439 284 DIV. 16
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION,
AD-439 286 DIV. 16

MUSCLES
ULTRASONIC RADIATION
ELECTRON MICROSCOPE STUDY OF ULTRASONICALLY IRRADIATED MUSCLE,
AD-438 641 DIV. 16

MUSCLES
VOLTAGE
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION,
AD-439 285 DIV. 16

NATIONAL DEFENSE
UNITED STATES
SPACE ARMS CONTROL: TRENDS, CONCEPTS, PROSPECTS,
AD-438 436 DIV. 18

NAVAL PERSONNEL
ELECTRONICS
TRAINING, UTILIZATION, AND PROFICIENCY OF NAVY ELECTRONICS TECHNICIANS, V. WORK DIARIES,
AD-438 215 DIV. 28

NAVIGATION COMPUTERS
AIRCRAFT EQUIPMENT
RHO/RHO COMPUTER DISPLAY,
AD-438 175 DIV. 1

NAVIGATION SATELLITES
GUIDED MISSILE TRACKING SYSTEMS
A SUMMARY OF CONFIGURATION DESIGN STUDIES FOR A RANGE INSTRUMENTATION CALIBRATION SATELLITE,
AD-439 358 DIV. 12

NEON
PLASMA MEDIUM
ELECTRON COLLISIONS IN NEON PLASMA,
AD-439 438 DIV. 25

NEOPLASMS
LIVER
STUDIES ON THE CHROMOSOMAL DIFFERENCES AMONG VARIOUS ASCITES HEPATOMAS OF RATS,
AD-438 653 DIV. 16
STUDIES ON THE CHROMOSOMAL DIFFERENCES AMONG VARIOUS ASCITES HEPATOMAS OF RATS,
AD-438 654 DIV. 16

NEOPLASMS
THERAPY
HETEROGENEITY OF CANCER CELL POPULATION WITH REGARD TO THE NATURAL DRUG RESISTANCE OF CANCER CELL,
AD-439 323 DIV. 16
HETEROGENEITY OF CANCER CELL POPULATION WITH REGARD TO THE NATURAL DRUG RESISTANCE OF CANCER CELL,
AD-439 324 DIV. 16
HETEROGENEITY OF CANCER CELL POPULATION WITH REGARD TO THE NATURAL DRUG RESISTANCE OF CANCER CELL,
AD-439 325 DIV. 16

NETWORKS
REDUCTION
VERTEX REDUCTION NETWORK ANALYSIS,
AD-438 498 DIV. 8

NETWORKS
RELIABILITY
ON THE PROBABILISTIC NETWORKS,
AD-438 497 DIV. 8

NETWORKS
SEQUENTIAL ANALYSIS
SPEED INDEPENDENT NOR REALIZATIONS,
AD-439 439 DIV. 30

NETWORKS
TOPOLOGY
VERTEX REDUCTION NETWORK ANALYSIS,
AD-438 498 DIV. 8

NEUROMUSCULAR TRANSMISSION
DRUGS
FACTORS MODIFYING THE ACTION OF NEUROMUSCULAR BLOCKING AGENTS,
AD-439 674 DIV. 16

NEUROMUSCULAR TRANSMISSION
EXCITATION
MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION,
AD-438 743 DIV. 16

NEUTRON FLUX
REFLECTION
NEUTRON REFLECTION AND FLUX VERSUS DEPTH FOR ALUMINUM WITH AN APPENDIX NEUTRON DOSE TRANSMISSION VERSUS THICKNESS,
AD-439 641 DIV. 20

NEUTRONS
PENETRATION
PENETRATION OF NEUTRONS FROM A POINT FISSION SOURCE IN AIR: MOMENTS METHOD CALCULATION,
AD-439 583 DIV. 20

NICKEL ALLOYS
BRITTLENESS
PEST REACTIONS IN INTERMETALLIC COMPOUNDS, II, INVESTIGATIONS ON NIAL, AND TWO MOSI2 STRUCTURES,
AD-439 216 DIV. 17

NIGHT SKY
INTERFEROMETERS
OBSERVATIONS OF THE 6300-ANGSTROM OI EMISSION OF THE NIGHTGLOW WITH A PRESSURE SCANNING FABRY-PEROT INTERFEROMETER,
AD-439 688 DIV. 2

NIGHT SKY
LUMINESCENCE
REPRINT OF IRISH PAPER ON CHEMICAL REACTIONS CONTRIBUTING TO

MATERIAL FORMING
FIBERS
SILICA FIBER FORMING AND CORE SHEATH COMPOSITE FIBER DEVELOPMENT,
AD-438 145 DIV. 14

MATERIAL FORMING
METAL SPINNING
METASTABLE AUSTENITIC FORMING OF HIGH STRENGTH PRESSURE VESSELS,
AD-438 009 DIV. 26
STUDY OF THE FEASIBILITY OF APPLYING ULTRASONIC ENERGY TO THE ROLLING PROCESS FOR SHEET METALS,
AD-438 937 DIV. 26

MATERIALS
ABSTRACTS
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
AD-437 980 DIV. 14

MATERIALS
DOCUMENTATION
INFORMATION REQUIREMENTS FOR APPLICATION OF NON-METALLIC STRUCTURAL MATERIALS TO AEROSPACE VEHICLES,
AD-439 427 DIV. 14

MATERIALS
IDENTIFICATION
MATERIAL IDENTIFICATION (SORTING),
AD-439 601 DIV. 14

MATERIALS
MEMORY
A NOTE ON THE MECHANICAL CONSTITUTIVE EQUATIONS FOR MATERIALS WITH MEMORY,
AD-439 265 DIV. 15

MATERIALS
THERMAL INSULATION
DEVELOPMENTS IN THERMAL-STRUCTURAL COMPOSITES AT GENERAL DYNAMICS/FORTH WORTH,
AD-438 471 DIV. 14

MATERIALS
VISCOELASTICITY
A METHOD OF DYNAMIC FRINGE PREDICTION IN BIREFRINGENT VISCOELASTIC MATERIALS,
AD-439 620 DIV. 14

MATHEMATICAL ANALYSIS
TESTS
SOME GENERALIZATIONS OF A THEORETICAL DISTRIBUTION OF MENTAL TEST SCORES,
AD-439 258 DIV. 15

MATHEMATICAL LOGIC
BIONICS
MODAL AND MANY -VALUED LOGICS,
AD-437 998 DIV. 15

MECHANICAL WAVES
DAMPING
SUITABILITY OF MIL-P-23653 MATERIAL FOR DAMPING MECHANICAL VIBRATIONS IN LIGHT STEEL PLATING,
AD-439 491 DIV. 14

MECHANICAL WAVES
THEORY
REFLECTIONS IN AND FROM ONE-DIMENSIONAL REGULAR AND IMPERFECT POINT LATTICES
AD-439 609 DIV. 25

MEDICAL RESEARCH
JAPAN
EXPERIMENTAL SURGERY ON RESUSCITATI AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG,
AD-439 022 DIV. 16
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS,
AD-439 053 DIV. 16
PHYSIOCOCHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES,
AD-439 270 DIV. 16
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM,
AD-439 296 DIV. 16
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM,
AD-439 298 DIV. 16
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM,
AD-439 299 DIV. 16
STUDY ON THE INTRACELLULAR CALCIFICATION BY ORAL LEPTOTRICHIA,
AD-439 303 DIV. 16
STUDY ON THE INTRACELLULAR CALCIFICATION BY ORAL LEPTOTRICHIA,
AD-439 304 DIV. 16
STUDY ON THE INTRACELLULAR CALCIFICATION BY ORAL LEPTOTRICHIA,
AD-439 305 DIV. 16
THE STUDY ON THE PATHOGENESIS OF BACILLARY DYSENTERY,
AD-439 306 DIV. 16
EXPERIMENTAL STUDIES OF THE EFFECT OF CALCIUM DEFICIENT DIET TO THE ARTERIAL WALL AND OTHER TISSUES WITH SPECIAL REFERENCE TO CEREBROVASCULAR DISEASES,
AD-439 307 DIV. 16
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES,
AD-439 317 DIV. 16
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES,
AD-439 318 DIV. 16
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES,
AD-439 319 DIV. 16
THE BIOLOGICAL SIGNIFICANCE AND CHEMISTRY OF A PROTEASE INHIBITOR NEWLY ISOLATED FROM ANIMAL TISSUES,
AD-439 320 DIV. 16

MEMORY
CEREBRAL CORTEX
STUDIES OF: (A) THE VISUAL FIELDS OF MONKEYS (B) MEMORY PROCESSES AS AFFECTED BY CEREBRAL LESIONS IN MONKEYS,
AD-438 389 DIV. 16

MEMORY
RECALL
SHORT-TERM MEMORY: NON-EQUIVALENCE OF QUERY AND MESSAGE ITEMS,
AD-437 917 DIV. 28

MERCHANT VESSELS
NUCLEAR POWERED VESSELS
CALCULATED NORMAL MODES AND NATURAL FREQUENCIES OF NS SAVANNAH, INCLUDING SPRUNG MASS CONSIDERATION OF THE CONTAINMENT VESSEL,
AD-439 207 DIV. 31

MERCURY
FLUID DYNAMIC PROPERTIES
VOID FRACTION MEASUREMENTS IN CAVITATING MERCURY,
AD-438 262 DIV. 9

METABOLISM
BACTERIA
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS,
AD-438 544 DIV. 16

METABOLISM
BIOCHEMISTRY
BIOCHEMICAL AND GENETICAL STUDIES OF INH METABOLISM,
AD-439 297 DIV. 16

METABOLISM
CALCIFICATION
STUDY ON THE INTRACELLULAR CALCIFICATION BY ORAL LEPTOTRICHIA,
AD-439 303 DIV. 16
STUDY ON THE INTRACELLULAR CALCIFICATION BY ORAL LEPTOTRICHIA,
AD-439 304 DIV. 16
STUDY ON THE INTRACELLULAR CALCIFICATION BY ORAL LEPTOTRICHIA,
AD-439 305 DIV. 16

METABOLISM
CARBOHYDRATES
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY,
AD-438 751 DIV. 16
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY,
AD-438 752 DIV. 16
ENZYMIC ADAPTATION RELATED TO CARBOHYDRATE METABOLISM IN ANIMAL BODY,
AD-438 753 DIV. 16

METABOLISM
DRUGS
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM,
AD-439 299 DIV. 16

METABOLISM
ISONIAZID
BIOCHEMICAL AND GENETICAL STUDIES ON INH METABOLISM,
AD-439 298 DIV. 16

METAL FILMS
OPTICAL PROPERTIES
A METHOD FOR DETERMINATION OF THE OPTICAL CONSTANTS OF THIN ABSORBING LAYERS,
AD-438 012 DIV. 25
MECHICAL PROPERTIES OF 17-4PH STEEL, HOMOGENIZED VERSUS AS RECEIVED CONDITION,
AD-438 142 DIV. 17

METALLIC TEXTILES
BERYLLIUM
STUDY OF SIZE EFFECT IN FINE BERYLLIUM WIRE PHASE II
AD-438 478 DIV. 17

METALS
DEFORMATION
EFFECTS OF ULTRASOUND ON DEFORMATION CHARACTERISTICS OF STRUCTURAL METALS,
AD-439 384 DIV. 17

METEOROLOGICAL PARAMETERS
ANALYSIS
STRATOSPHERIC WIND TEMPERATURE AND ISOBARIC HEIGHT CONDITIONS DURING THE IGY PERIOD PART II,
AD-439 248 DIV. 2

METEOROLOGICAL PARAMETERS
ATMOSPHERE MODELS
THE EFFECTS OF THE ACCURACY OF ATMOSPHERE DATA ON THE STRUCTURAL DESIGN LOADS OF A TYPICAL LAUNCH VEHICLE,
AD-437 972 DIV. 12

METEOROLOGICAL SATELLITES
PHOTOGRAPHY
SATELLITE PHOTOGRAPHY AS A MEANS OF EVALUATING THE EQUATIONS OF VERTICAL MOTION,
AD-438 918 DIV. 2

METEOROLOGY
DATA
METEOROLOGICAL DATA REPORT AEROBEE KP 3.3,
AD-439 680 DIV. 12

METEORS
ATMOSPHERE ENTRY
THE PHYSICS OF METEOR ENTRY,
AD-438 437 DIV. 2

METEORS
RADIO WAVES
RADIO-ECHO STUDIES OF METEORS AT 68-CM WAVELENGTH, PART II SPORADIC METEORS,
AD-439 354 DIV. 2

METEORS
SOUND
STRANGE SOUNDS FROM THE SKY,
AD-439 336 DIV. 2

MICROORGANISMS
IDENTIFICATION
THE IDENTIFICATION AND MODE OF ACTION OF MIYAGAWANELLA AS RELATED TO TRACHOMA, ATYPICAL PNEUMONIA AND OTHER CLINICAL DISORDERS INCLUDING THE THERAPEUTIC IMPLICATIONS THERE OF,
AD-438 528 DIV. 16

MICROORGANISMS
KWAJALEIN ATOLL
MICROFLORA AT KWAJALEIN ISLAND,
AD-439 206 DIV. 16

MICROSCOPES
IONS
FIELD ION MICROSCOPE,
AD-439 000 DIV. 25

MICROSEISMS
NOISE
IDENTIFICATION AND ELIMINATION OF MICROSEISM NOISE AT DEPTH USING THEORETICAL RAYLEIGH WAVE AND OBSERVED NOISE DILATATION,
AD-439 422 DIV. 2

MICROSOMES
BIOCHEMISTRY
PHYSICAL AND BIOCHEMICAL STUDIES ON THE MICROSOMES AND ITS NUCLEIC ACID,
AD-439 070 DIV. 16

MICROSOMES
NUCLEIC ACID
PHYSICAL AND BIOCHEMICAL STUDIES ON THE MICROSOMES AND ITS NUCLEIC ACID,
AD-439 070 DIV. 16

MICROWAVE AMPLIFIERS
DESIGN
DEVELOPMENT OF A HIGH FREQUENCY ELECTRON-BEAM PARAMETRIC AMPLIFIER,
AD-439 520 DIV. 8

MICROWAVE AMPLIFIERS
ELECTRON GUNS
HIGH PERVEANCE GUN STUDY,
AD-438 521 DIV. 8

MICROWAVE AMPLIFIERS
PHASED ARRAYS
DEVELOPMENT OF A GRIDDED 100 KW L-BAND AMPLIFIER SUITABLE FOR APPLICATION IN PHASED-ARRAY RADAR SYSTEMS,
AD-438 129 DIV. 8

MICROWAVE AMPLIFIERS
TRAVELING-WAVE TUBES
DESIGN FOR A HOLLOW-BEAM, DISC-LOADED, COAXIALLINE, TRAVELING-WAVE AMPLIFIER,
AD-438 253 DIV. 8

MICROWAVE EQUIPMENT
DIELECTRIC PROPERTIES
DIELECTRIC GASES: REDUCTION OF LEAKAGE COSTS IN HIGH POWER MICROWAVE SYSTEMS,
AD-438 052 DIV. 8

MICROWAVE EQUIPMENT
MATHEMATICAL MODELS
COUPLED MODE THEORY FOR ADVANCED MICROWAVE DEVICES,
AD-438 256 DIV. 5

MICROWAVE EQUIPMENT
MICROWAVE SPECTROSCOPY
ELECTRONIC EQUIPMENT INTERFERENCE CHARACTERISTICS-COMMUNICATION TYPE,
AD-439 503 DIV. 8

MICROWAVE NETWORKS
MATRIX ALGEBRA
SCATTERING MATRIX OF A MODIFIED (FIVE-PORT) TURNSTILE,
AD-439 484 DIV. 8

PERIODIC VARIATIONS
TREMATODES
SEASONAL VARIATIONS IN THE INCIDENCE OF PARAGONIMUS WESTERMANI INFECTION IN ERIOCHEIR JAPONICUS,
AD-439 639 DIV. 16

PERSONALITY
ANALYSIS
REGRESSION: AN ANALYTICAL AID FOR THE ADMISSION OF MASTER'S DEGREE CANDIDATES,
AD-438 915 DIV. 33

PERSONNEL
SCIENTIFIC RESEARCH
ABSTRACTS OF USAPRO RESEARCH PUBLICATIONS--FY 1963,
AD-438 846 DIV. 30

PERTURBATION THEORY
QUANTUM MECHANICS
STUDIES IN PERTURBATION THEORY, VIII. SEPARATION OF DIRAC EQUATION AND STUDY OF THE SPIN-ORBIT COUPLING AND FERMI CONTACT TERMS,
AD-437 902 DIV. 20

PHASED ARRAYS
MICROWAVE AMPLIFIERS
DEVELOPMENT OF A GRIDDED 100 KW L-BAND AMPLIFIER SUITABLE FOR APPLICATION IN PHASED-ARRAY RADAR SYSTEMS,
AD-438 129 DIV. 8

PHENOLS
AMINES
DISTRIBUTION OF BIOLOGICALLY ACTIVE COMPOUNDS IN THE BODY,
AD-438 395 DIV. 16

PHENOLS
SYNTHESIS (CHEMISTRY)
SYNTHESIS OF SELECTED ETHERS, PHENOLS AND RELATED COMPOUNDS HAVING NITROGEN-CONTAINING GROUPS,
AD-439 242 DIV. 4

PHOSPHORUS
ADSORPTION
ADSORPTION AND SORPTION COMPLEXES,
AD-439 607 DIV. 4

PHOTOELASTICITY
TEST METHODS
A METHOD OF DYNAMIC FRINGE PREDICTION IN BIREFRINGENT VISCOELASTIC MATERIALS,
AD-439 620 DIV. 14

PHOTOELECTRIC CELLS (SEMICONDUCTOR)
ELECTROLUMINESCENCE
ADVANCED FUNCTIONAL ELECTRONIC BLOCK DEVELOPMENT,
AD-438 959 DIV. 8

PHOTOGRAPHIC PROCESSING EQUIPMENT
AERIAL RECONNAISSANCE
DENSITY DISCRIMINATION FOR PRINTER UTILIZATION STUDY,
AD-438 418 DIV. 24

PHOTOLYSIS
AMMONIA
FLASH PHOTOLYSIS AND FLUORESCENCE OF NH3 IN THE VACUUM ULTRAVIOLET,
AD-438 411 DIV. 4
PHOTOLYSIS OF AMMONIA IN THE FAR ULTRAVIOLET,
AD-438 494 DIV. 4

PHOTOLYSIS
FLUORESCENCE
PHOTODISSOCIATION AND FLUORESCENCE IN THE SCHUMANN-UV,
AD-438 486 DIV. 4

PHOTOLYSIS
NITROGEN
MASS-SPECTROMETRIC INVESTIGATION OF THE PHOTOIONIZATION OF THE NITROGEN MOLECULE,
AD-438 412 DIV. 4

PHOTOLYSIS
NITROGEN COMPOUNDS
INFRARED STUDIES OF FREE RADICALS AND UNSTABLE REACTION INTERMEDIATES,
AD-438 297 DIV. 4

PHOTOMULTIPLIERS
ELECTRONS
IMPROVEMENT OF PHOTOMULTIPLIER RESPONSE AND DEVELOPMENT OF A DEVICE FOR MEASUREMENT OF KEV AURORAL ELECTRONS,
AD-438 427 DIV. 28

PHOTONS
SCATTERING
MONTE CARLO COMPUTATION OF 100,000 1 MEV GAMMA RAYS SCATTERED BY CONCRETE SLABS,
AD-438 908 DIV. 20

PHYSICAL PROPERTIES
STUDS
SOME ASPECTS OF SAWING ACCURACY IN CIRCULAR MILLS,
AD-438 013 DIV. 24

PHYSIOLOGY
AMPUTATION STUMPS
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG,
AD-439 023 DIV. 16

PIONS
ABSORPTION
ABSORPTION OF NEGATIVE PI MESONS IN LIGHT NUCLEI,
AD-439 331 DIV. 20

PIPES
TANTALUM ALLOYS
TANTALUM ALLOY TUBING DEVELOPMENT PROGRAM,
AD-438 777 DIV. 17

PISTONS
INTERNAL COMBUSTION ENGINE NOISE
PISTON-SLAP NOISE IN RECIPROCATING MACHINERY,
AD-439 205 DIV. 27

PLASMA JETS
ELECTRON DENSITY
DETERMINATION OF ELECTRON DENSITY DISTRIBUTION IN A PLASMA JET USING A LANGMUIR PROBE,
AD-439 007 DIV. 25

PLASMA MEDIUM
ANTENNAS
EFFECTS OF RE-ENTRY PLASMA SHEATH ON ANTENNA CHARACTERISTICS,
AD-438 964 DIV. 8

PLASMA MEDIUM
ELECTRIC ARCS
PLASMA ARC DEPOSITION FOR AEROSPACE APPLICATIONS,
AD-438 469 DIV. 25
MOLECULAR STORAGE AND TRANSFER OF ELECTROMAGNETIC ENERGY IN GASEOUS PLASMAS,
AD-438 419 DIV. 25
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS,
AD-439 831 DIV. 25
INTERACTION OF ELECTROMAGNETIC WAVES AND CLASSICAL PLASMAS,
AD-439 839 DIV. 25

PLASMA MEDIUM
NEON
ELECTRON COLLISIONS IN NEON PLASMA,
AD-439 438 DIV. 25

PLASMA MEDIUM
SHOCK WAVES
EXCITATION OF PLASMA OSCILLATIONS BY SHOCK WAVES,
AD-439 209 DIV. 25

PLASMA SHEATH
SIMULATION
SIMULATION OF A THIN PLASMA SHEATH BY A PLANE OF WIRES,
AD-439 244 DIV. 25

PLASTIC COATINGS
METALS
THE DEVELOPMENT AND EVALUATION OF HEAT-RESISTANT, RAIN-EROSION-RESISTANT COATINGS,
AD-439 492 DIV. 14

PLASTICS
FOAMS
THEORETICAL INVESTIGATIONS OF SCATTERING FROM PLASTIC FOAMS,
AD-437 900 DIV. 8

POISONING
CELLS (BIOLOGY)
CELL DAMAGE IN LIVER AND KIDNEYS AS REVEALED BY LIGHT AND ELECTRON MICROSCOPY,
AD-438 534 DIV. 16

POLYCYCLIC COMPOUNDS
KETONES
THE SYNTHESIS OF NON-COMMERCIALLY AVAILABLE ORGANIC COMPOUNDS,
AD-439 402 DIV. 4

POLYCYCLIC COMPOUNDS
STEREOCHEMISTRY
FACTORS INVOLVED IN THE STABILITY OF CYCLOPROPANES,
AD-438 396 DIV. 4

POLYETHYLENE PLASTICS
BALLOONS
POLYPROPYLENE BALLOON STUDY,
AD-439 357 DIV. 1

POLYMERIZATION
FLUORINE COMPOUNDS
SYNTHESIS AND POLYMERIZATION OF FLUORINATED SULFUR MODIFIED NITROSO RUBBER,
AD-437 996 DIV. 4

POLYMERS
REFRACTIVE INDEX
A STUDY OF DYNAMIC BIREFRINGENCE IN POLYMERIC SOLIDS,
AD-438 545 DIV. 14

POLYMERS
SYNTHETIC RUBBER
ARCTIC RUBBER,
AD-437 995 DIV. 4

POLYNOMIALS
FUNCTIONS
ON THE EQUIVALENCE OF POLYNOMIAL AND FUNCTIONAL FORMS OF CONSTITUTIVE EQUATIONS FOR A CLASS OF LARGE DEFORMATIONS,
AD-439 647 DIV. 28

POTASSIUM
DIFFUSION
DIFFUSION OF POTASSIUM IN A LIQUID METAL CELL,
AD-439 407 DIV. 28

POWDERS
MIXTURES
A FUNDAMENTAL STUDY OF THE VARIABLES ASSOCIATED WITH THE MIXING OF CERAMIC RAW MATERIALS,
AD-439 599 DIV. 14

POWER EQUIPMENT
LUNAR BASES
ENGINEERING STUDY OF MULTIPURPOSE ENGINE AND FUEL SYSTEM FOR MANNED LUNAR BASES,
AD-439 835 DIV. 7

POWER EQUIPMENT
TESTS
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN),
AD-437 986 DIV. 7

POWER EQUIPMENT
THERMIONIC CONVERTERS
LIQUID METAL-HEATED SPACE RADIATOR-MOUNTED THERMIONIC GENERATOR,
AD-437 926 DIV. 7

POWER SUPPLIES
LUNAR BASES
ENGINEERING STUDY OF MULTIPURPOSE ENGINE AND FUEL SYSTEM FOR MANNED LUNAR BASES,
AD-439 829 DIV. 7

PRESERVATION
WOOD
OVERLAYS FOR LUMBER--AN OLD PRODUCT IN A NEW DRESS,
AD-438 020 DIV. 14

PRESSURE VESSELS
MATERIAL FORMING
METASTABLE AUSTENITIC FORMING OF HIGH STRENGTH PRESSURE VESSELS,
AD-438 009 DIV. 24

PRIMARY CELLS
TESTS
TESTING AND EVALUATION OF PRIMARY ALKALINE CELLS AND BATTERIES,
AD-439 454 DIV. 7

PROBABILITY
STOCHASTIC PROCESSES
SOME THEOREMS ON FUNCTIONALS OF MARKOV CHAINS,
AD-438 439 DIV. 18

PROCUREMENT
PERSONNEL
INCENTIVES AND R&D CONTRACTING,
AD-439 373 DIV. 32

PRODUCTION
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N328A TRANSISTOR,
AD-439 408 DIV. 24

PROGRAMMING LANGUAGES
DATA PROCESSING SYSTEMS
THE LOGIC DESIGN OF ADAM, A PROBLEM-ORIENTED SYMBOL PROCESSOR,
AD-438 705 DIV. 30
THE LOGIC DESIGN OF ADAM, A PROBLEM-ORIENTED SYMBOL PROCESSOR,
AD-438 705 DIV. 30
NAVIC POL INFORMATION SYSTEM, CAPABILITY EXPANSION FOR CONSUMPTION DATA, PROGRAMMERS, USERS, AND OPERATORS MANUAL,
AD-438 836 DIV. 30

PROGRAMMING (COMPUTERS)
MILITARY STRATEGY
A PREVIEW OF MILITRAN, A SYSTEM FOR THE DEVELOPMENT OF COMPUTER PROGRAMS THAT SIMULATE MILITARY SITUATIONS,
AD-438 866 DIV. 18

PROGRAMMING (COMPUTERS)
SCIENTIFIC RESEARCH
SOME DIRECTIONS OF RESEARCH IN DYNAMIC PROGRAMMING,
AD-438 438 DIV. 30

PROGRAMMING (COMPUTERS)
SIMULATION
SIMULATION SYSTEM PROGRAMMING DESIGN MANUAL,
AD-439 418 DIV. 30

PROPAGATION
MICROWAVES
MICROWAVE INVESTIGATION OF THE DIELECTRIC WAVEGUIDE PROPAGATION BY MAGNETO-IONIC DUCTS,
AD-439 213 DIV. 25

PROPAGATION
REENTRY VEHICLES
RE-ENTRY PROPAGATION AND ANTENNA STUDIES,
AD-438 963 DIV. 8
ABSTRACTS OF PROJECTS ON PROPELLANT ACTUATED DEVICES FOR THE U.S. AIR FORCE,
AD-439 662 DIV. 12

PROPELLER BLADES
LOAD DISTRIBUTION

NIGHTGLOW,
AD-439 651 DIV. 2

NIOBIUM ALLOYS
VANADIUM ALLOYS
VANADIUM ALLOY STUDIES,
AD-438 875 DIV. 17

NITROGEN
PHOTOLYSIS
MASS-SPECTROMETRIC INVESTIGATION OF THE PHOTOIONIZATION OF THE NITROGEN MOLECULE,
AD-438 412 DIV. 4

NITROGEN COMPOUNDS
FREE RADICALS
INVESTIGATION OF THE DISSOCIATION CHEMISTRY OF -NF2 COMPOUNDS,
AD-439 527 DIV. 4

NITROGEN COMPOUNDS
HYPERFINE STRUCTURE
RESEARCH DIRECTED TOWARD THE STUDY OF THE STRUCTURAL AND ULTRAVIOLET SPECTRA OF FREE RADICALS, MOLECULES AND MOLECULAR IONS USING THEORETICAL AND COMPUTATIONAL METHODS,
AD-437 952 DIV. 25

NOISE
EXTREMELY LOW FREQUENCY
RESEARCH ON ELECTROMAGNETIC NOISE AT EXTREMELY LOW FREQUENCIES,
AD-439 640 DIV. 8
GUIDE FOR STRUCTUREBORNE MACHINERY NOISE MEASUREMENTS,
AD-439 291 DIV. 31

NONLINEAR SYSTEMS
EQUATIONS
CONSTITUTIVE EQUATIONS OF VISCOELASTIC SOLIDS UNDER FINITE DEFORMATION,
AD-439 605 DIV. 25

NUCLEAR EXPLOSIONS
RADIO TRANSMISSION
A NOTE ON PERSISTING RADIO PROPAGATION EFFECTS AFTER HIGH-ALTITUDE NUCLEAR BURSTS,
AD-438 822 DIV. 8

NUCLEAR EXPLOSIONS
SOIL MECHANICS
THEORETICAL STUDY OF ENERGY DISTRIBUTION IN A HALF-SPACE RESULTING FROM DYNAMIC LOADING IN A DEPRESSION AT THE ORIGIN,
AD-438 711 DIV. 20

NUCLEAR EXPLOSIONS
THERMAL RADIATION
INVESTIGATION OF FLUORO COMPOUNDS FOR THERMAL PROTECTION,
AD-438 520 DIV. 14

NUCLEAR MAGNETIC RESONANCE
BORANES
32 MC, B'' N.M.R. SPECTRA OF R2C2B4H6 AND 1-10D0 B10H13,
AD-439 005 DIV. 4

NUCLEAR POWER PLANTS
LUNAR BASES
ENGINEERING STUDY OF NUCLEAR POWER PLANT FOR MANNED LUNAR BASES,
AD-439 837 DIV. 20

NUCLEAR POWERED VESSELS
MERCHANT VESSELS
CALCULATED NORMAL MODES AND NATURAL FREQUENCIES OF NS SAVANNAH, INCLUDING SPRUNG MASS CONSIDERATION OF THE CONTAINMENT VESSEL,
AD-439 207 DIV. 31

NUCLEAR REACTORS
DOSE RATE
MEASUREMENTS OF THE EFFECTS OF COMPARTMENTALIZATION ON THE GAMMA-RAY AND NEUTRON DOSE RATE IN THE RADIATION FIELD OF A REACTOR,
AD-437 994 DIV. 20

NUCLEAR REACTORS
RADIATION HAZARDS
MOLLY-G REACTOR,
AD-438 955 DIV. 20
MEASURING RANGE: FROM 0.4 TO 1,000,000 ROENTGENS PER MINUTE,
AD-439 595 DIV. 20

NUCLEAR SCATTERING
EXCITATION
THEORY OF SCATTERING IN SOLIDS,
AD-438 130 DIV. 20

NUCLEI (BIOLOGY)
MORPHOLOGY (BIOLOGY)
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS,
AD-438 543 DIV. 16

NUCLEIC ACIDS
MAGNETIC PROPERTIES
PHYSICOCHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES,
AD-439 270 DIV. 16

NUCLEOTIDYL TRANSFERASES
PURIFICATION
METABOLIC FUNCTION OF EDOXYNUCLEOSIDIC COMPOUNDS,
AD-438 742 DIV. 16

NURSES
EDUCATION
SELF-DIRECTED INQUIRY IN CLINICAL NURSING INSTRUCTION BY MEANS OF THE PLATO SIMULATED LABORATORY
AD-437 952 DIV. 25
SELF-DIRECTED INQUIRY IN CLINICAL NURSING INSTRUCTION BY MEANS OF THE PLATO SIMULATED LABORATORY,
AD-437 982 DIV. 33

NUTRITION
DEFICIENCY DISEASES
EXPERIMENTAL STUDIES OF THE EFFECT OF CALCIUM DEFICIENT DIET TO THE ARTERIAL WALL AND OTHER TISSUES WITH SPECIAL REFERENCE TO CEREBROVASCULAR DISEASES,
AD-439 307 DIV. 16

N-BODY PROBLEM
MOTION
MOTION IN THE VICINITY OF THE TRIANGULAR LIBRATION CENTERS,
AD-439 219 DIV. 2

N-BODY PROBLEM
TOPOLOGY
ON THE STABILITY OF THE EQUILIBRIUM SOLUTIONS OF THE PLANE RESTRICTED THREE BODY PROBLEM IN THE SENSE OF LIAPOUNOV,
AD-438 857 DIV. 25

N-HETEROCYCLIC COMPOUNDS
SYNTHESIS (CHEMISTRY)
THE SYNTHESIS OF NON-COMMERCIALLY AVAILABLE ORGANIC COMPOUNDS,
AD-439 402 DIV. 4

OCEAN BOTTOM
ANALYSIS
STUDY OF NEAR-SHORE BOTTOM PROFILES EAST AND SOUTHWEST OF POINT BARROW, ALASKA: COMPARISON OF PROFILES AND THE BARRIER ISLANDS IN THE POINT LAY AND PLOVER ISLANDS AREAS,
AD-438 463 DIV. 2

OPERATIONS RESEARCH
PAYLOAD
A PARAMETRIC STUDY OF THE DELIVERY UNDER RISK PROBLEM AS IT APPLIES TO INTERDICTION COST EFFECTIVENESS,
AD-439 499 DIV. 18

OPTICAL INSTRUMENTS
RESONATORS
ANALYSIS OF OPTICAL RESONATORS INVOLVING FOCUSING ELEMENTS,
AD-438 428 DIV. 25

OPTIMIZATION
FLIGHT PATHS
A STUDY OF OPTIMIZATION TECHNIQUES,
AD-438 980 DIV. 15

ORGANIC NITROGEN COMPOUNDS
FLUORINE COMPOUNDS
LINEAR POLYFLUORINATED ANALAGOUSLY BIFUNCTIONAL COMPOUNDS AS POTENTIAL MONOMERS,
AD-437 962 DIV. 4

ORGANIC NITROGEN COMPOUNDS
SYNTHESIS (CHEMISTRY)
SYNTHESIS OF SELECTED ETHERS, PHENOLS AND RELATED COMPOUNDS HAVING NITROGEN-CONTAINING GROUPS,
AD-439 242 DIV. 4

ORGANIC PHOSPHORUS COMPOUNDS
THERMOSETTING PLASTICS
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES,
AD-438 187 DIV. 4

ORGANOBORANES
NUCLEAR MAGNETIC RESONANCE
32 MC, B'' N.M.R. SPECTRA OF R2C2B4H6 AND 1-10D0 B10H13,
AD-439 005 DIV. 4

OSCILLATION
EXCITATION
EXCITATION OF PLASMA OSCILLATIONS BY SHOCK WAVES,
AD-439 209 DIV. 25

OXIDES
MARKERS
INVESTIGATION OF THE BURNING CHARACTERISTICS OF THE LEAD DIOXIDE-CUPRIC OXIDE-SILICON STARTER COMPOSITION,
AD-437 978 DIV. 3

OXYGEN
EYE
REVIEW OF THE EFFECTS OF HIGH OXYGEN EXPOSURE TO THE EYE,
AD-438 909 DIV. 16

OXYGEN
FUEL CELLS
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL,
AD-439 670 DIV. 7

OXYGEN
STABILITY
STUDIES ON THE HEMOGLOBIN-OXYGEN EQUILIBRIUM,
AD-439 020 DIV. 16

OZONE
ATMOSPHERE
RESULTS OF OBSERVATIONS ON ATMOSPHERIC OZONE BY THE INFRARED METHOD, DEDUCED FROM DATA OBTAINED IN AROSA (SWITZERLAND),
AD-439 212 DIV. 2

OZONE
SPECTRA (INFRARED)
DETERMINATION OF SMOOTH DISTRIBUTION OF ATMOSPHERIC OZONE FROM THE ABSORPTION AND EMISSION OF THE 9.6 MICRONS BAND,
AD-438 413 DIV. 2

OZONE
SWITZERLAND
VERTICAL OZONE DISTRIBUTION OVER AROSA,
AD-439 211 DIV. 2

PANELS (STRUCTURAL)
BERYLLIUM
SHEAR TEST OF CHEMICAL MILLED BERYLLIUM WAFFLE PANEL,
AD-438 138 DIV. 17

PANORAMIC CAMERAS
AERIAL CAMERAS
CIRCUMFERENTIAL VERTICAL PERSPECTIVE AERIAL CAMERA,
AD-439 597 DIV. 24

PARAMETRIC AMPLIFIERS
ELECTRON BEAMS
DEVELOPMENT OF A HIGH FREQUENCY ELECTRON-BEAM PARAMETRIC AMPLIFIER,
AD-439 520 DIV. 8

PARAMETRIC AMPLIFIERS
MATERIALS
INVESTIGATION OF MICROWAVE NON-LINEAR EFFECTS UTILIZING FERROMAGNETIC MATERIALS,
AD-438 185 DIV. 8

PARASITE DISEASES
LUNGS
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS,
AD-439 254 DIV. 16

PARASITES
INFECTIONS
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS,
AD-439 282 DIV. 16

PARASITES
PUBLIC HEALTH
AN EPIDEMIOLOGIC SURVEY OF PARAGONIMUS WESTERMANI (KERBERT, 1878) AND RELATED SPECIES IN TAIPEI COUNTY, TAIWAN,
AD-439 643 DIV. 16

PARASITIC DISEASES
JAPAN
STUDIES ON IMMUNOLOGICAL DIAGNOSIS OF PARAGONIMIASIS,
AD-438 535 DIV. 16
STUDIES ON PARAGONIMIASIS,
AD-438 536 DIV. 16
STUDIES ON PARAGONIMIASIS,
AD-438 537 DIV. 16
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS,
AD-438 538 DIV. 16

PARASITIC DISEASES
LUNGS
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND CHEMOTHERAPY OF PARAGONIMIASIS (LUNG FLUKE DISEASE),
AD-439 253 DIV. 16
STUDIES ON IMMUNOLOGICAL DIAGNOSIS AND THERAPY OF PARAGONIMIASIS,
AD-439 255 DIV. 16

PARTIAL DIFFERENTIAL EQUATIONS
NUMERICAL METHODS AND PROCEDURES
SOLVING NUMERICALLY THE NAVIER-STOK EQUATIONS,
AD-439 220 DIV. 9

PARTICLES
COBALT COMPOUNDS
STUDY OF OXIDES FOR O2 -N2 SEPARATION,
AD-438 163 DIV. 4

PENICILLINS
HISTORY
SEPARATING RESEARCH FROM RESEARCH AND DEVELOPMENT,
AD-439 524 DIV. 30

PERFORMANCE (ENGINEERING)
ELECTRIC SWITCHES
MULTI-STATION PUSH BUTTON SWITCH,
AD-437 931 DIV. 7

PERFORMANCE (HUMAN)
HOT ENVIRONMENT
THE HUMAN THERMAL ENVIRONMENT IN A WET TROPICAL AREA (OPERATION SWAMP FOX II),
AD-437 923 DIV. 16

CHARACTERISTICS OF HIGH CURRENT FIRING PULSES ON SQUIBS AND BLASTING CAPS,
AD-439 488 DIV. 28

RADIOFREQUENCY SPECTROSCOPY
SPECTRUM ANALYZERS
RF SPECTRUM ANALYZER,
AD-438 196 DIV. 8

RADIOMETERS
L BAND
L-BAND RADIOMETER TYPE 507,
AD-438 221 DIV. 30

RADIOMETERS
MICROWAVE EQUIPMENT
THE CRYSTAL-VIDEO RADIOMETER,
AD-438 232 DIV. 24

RADIOMETERS
REENTRY VEHICLES
DESIGN OF A UHF RADIMETER FOR PLASMA MEASUREMENTS,
AD-438 222 DIV. 8

RADIOPROTECTIVE AGENTS
CHEMICAL COMPOUNDS
A QUARTERLY PROGRESS REPORT ON THE EFFECTS OF IONIZING RADIATION, PROTECTIVE OR THERAPEUTIC COMPOUNDS AND EFFECTS OF LOW LEVELS OF GAMMA AND FAST NEUTRON EXPOSURE,
AD-438 895 DIV. 16

RADOMES
HIGH TEMPERATURE RESEARCH
DEVELOPMENT OF A 1200 F RADOME,
AD-438 134 DIV. 8

RADOMES
PLASTICS
FABRICATION OF A LIGHTWEIGHT PLASTIC MISSILE RADOME,
AD-439 224 DIV. 8

RAINFALL
PROTECTIVE CLOTHING
SPECIAL STUDY OF A METHOD FOR OBJECTIVELY DETECTING THE INSTANT AND LOCATION OF RAINFALL PENETRATION THROUGH FIELD CLOTHING,
AD-437 928 DIV. 29

RAMJET INLETS
HYPERSONIC DIFFUSERS
DESIGN ANALYSIS SUMMARY OF TWO FORCE-BALANCE HYPERSONIC INLET CONFIGURATIONS,
AD-437 909 DIV. 27

RANGE FINDING
LEAST SQUARES METHOD
GRAVITATIONAL SMOOTHING,
AD-437 999 DIV. 15

RARE EARTH COMPOUNDS
EXCITATION
DETERMINATION OF HYPERFINE INTERACTIONS IN SOLIDS BY THE USE OF RADIOACTIVE NUCLEI,
AD-438 046 DIV. 20

REACTION KINETICS
FLAMES
MECHANISM STUDIES ON THE CHEMICAL INHIBITION OF FLAMES,
AD-439 644 DIV. 10

REACTION KINETICS
OXIDATION
KINETIC AND AERODYNAMIC ASPECTS OF THE OXIDATION OF METALS BY PARTIALLY DISSOCIATED OXYGEN,
AD-438 927 DIV. 4

REACTION (PSYCHOLOGY)
SENSORY DEPRIVATION
REPORTED VISUAL SENSATIONS AS A FUNCTION OF SUSTAINED SENSORY DEPRIVATION AND SOCIAL ISOLATION,
AD-439 431 DIV. 28

REACTOR FUELS
URANIUM COMPOUNDS
DISPERSED URANIUM MONOCARBIDE -URANIUM NUCLEAR FUEL MATERIAL,
AD-438 919 DIV. 17

READING MACHINES
AUTOMATION
TEXT REPORTING AND EDITING DEVICE,
AD-438 417 DIV. 32

RECOMBINATION REACTIONS
ATMOSPHERE
THEORETICAL CALCULATION OF CROSS-SECTIONS OF IMPORTANCE TO ATMOSPHERIC DEIONIZATION,
AD-439 429 DIV. 25

RECORDING SYSTEMS
DIAGNOSTIC AGENTS
RECORDERS IN ELECTROMEDICAL DIAGNOSTIC APPARATUS,
AD-438 825 DIV. 16

REENTRY VEHICLES
APPLICATION OF HIGH MOMENT-PRODUCING TECHNIQUES FOR CONTROL OF A MANNED SPACE VEHICLE,
AD-439 202 DIV. 12

REENTRY VEHICLES
ANTENNAS
EFFECTS OF RE-ENTRY PLASMA SHEATH ON ANTENNA CHARACTERISTICS,
AD-438 969 DIV. 8

REENTRY VEHICLES
BASE FLOW
TURBULENT BASE FLOW BEHIND A SLENDER SUPERSONIC RE-ENTRY VEHICLE,
AD-439 219 DIV. 9

REENTRY VEHICLES
PROPAGATION
RE-ENTRY PROPAGATION AND ANTENNA STUDIES,
AD-438 963 DIV. 8

REFLECTORS
SOLAR FURNACES
STUDY, DESIGN, AND FABRICATION OF SOLAR ENERGY CONCENTRATOR MODELS,
AD-439 838 DIV. 24

REFRACTION
DEFORMATION
A STUDY OF DYNAMIC BIREFRINGENCE IN POLYMERIC SOLIDS,
AD-438 545 DIV. 14

REFRACTORY MATERIALS
BERYLLIUM COMPOUNDS
THERMODYNAMICS OF REFRACTORY COMPOUNDS OF BERYLLIUM (OXIDES, BORIDES, CARBIDES, AND NITRIDES): AN ANNOTATED BIBLIOGRAPHY,
AD-439 945 DIV. 14

REFRACTORY MATERIALS
THERMAL PROPERTIES
CARBONIZATION OF PLASTICS AND REFRACTORY MATERIAL RESEARCH. VOLUME II. REFRACTORY MATERIALS,
AD-438 050 DIV. 14

REFRACTORY METALS
OXIDATION
KINETIC AND AERODYNAMIC ASPECTS OF THE OXIDATION OF METALS BY PARTIALLY DISSOCIATED OXYGEN,
AD-438 927 DIV. 4

REINFORCING MATERIALS
CERAMIC FIBERS
INVESTIGATION OF BONDING IN OXIDE-FIBER (WHISKER)REINFORCED METALS,
AD-438 844 DIV. 14
FIBER-REINFORCED METALS AND ALLOYS,
AD-438 921 DIV. 17

RELATIVITY THEORY
THE SCHWARZSCHILD METRIC AND WHITEHEAD THEORY OF GRAVITATION,
AD-438 883 DIV. 25

RELAXATION OSCILLATORS
TRANSISTORS
TRANSISTOR FLIP-FLOP AND RING COUNTER WITH NONVOLATILE MEMORY,
AD-439 223 DIV. 8

RENDEZVOUS SPACECRAFT
FEASIBILITY STUDIES
A STUDY OF AN ORBITAL MAINTENANCE AND MATERIAL TRANSFER SHUTTLE,
AD-438 317 DIV. 12

REPORTS
INDEX
BIBLIOGRAPHY OF REPORTS,
AD-438 720 DIV. 12

REPORTS
SCIENTIFIC RESEARCH
RESEARCH REPORT ON A VARIETY OF PROJECTS,
AD-439 345 DIV. 30

RESEARCH PROGRAM ADMINISTRATION
PROCUREMENT
INCENTIVES AND R+D CONTRACTING,
AD-439 373 DIV. 32

RESISTANCE (ELECTRICAL)
HIGH-TEMPERATURE RESEARCH
THERMOELECTRIC MATERIALS,
AD-439 683 DIV. 25

RESONANCE SCATTERING
THEORY
MULTI-CHANNEL COLLISIONS,
AD-439 530 DIV. 25

RESONATORS
OPTICS
ANALYSIS OF OPTICAL RESONATORS INVOLVING FOCUSING ELEMENTS,
AD-438 928 DIV. 25

RESPIRATION
RECORDING SYSTEM
AUTOMATIC RECORDING OF PO2, PCO2, PH, NA AND K IN THE BLOOD AND THE BRAIN,
AD-438 200 DIV. 16

RETICLES
EFFECTIVENESS
AN EVALUATION OF A NEW RETICLE DESIGN IN GUNLAYING AGAINST FLASHES,
AD-438 011 DIV. 22

REVIEWS
HISTORY
ANGULAR MOMENTUM FLUX IN THE FORMATION OF THE SOLAR SYSTEM,
AD-438 007 DIV. 2

REVIEWS
PYROTECHNICS
SURVEY OF SENSITIVITY CHARACTERISTICS OF TYPICAL DELAY, IGNITER, FLASH, AND SIGNAL TYPE PYROTECHNIC COMPOSITIONS,
AD-439 383 DIV. 3

RHENIUM
NUCLEAR PROPERTIES
ADDENDUM TO FINAL TECHNICAL REPORT ON THE NUCLEAR PROPERTIES OF RHENIUM,
AD-439 807 DIV. 20

RIBONUCLEIC ACID
PROTEINS
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES,
AD-439 271 DIV. 16
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES,
AD-439 272 DIV. 16

RIBOSOMES
MOLECULAR PROPERTIES
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES,
AD-438 700 DIV. 16
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES,
AD-438 701 DIV. 16

ROCKET ANTENNAS
SCIENTIFIC RESEARCH
FLUSH AND NONFLUSH MOUNTED TELEMETRY ANTENNAS FLUSH MOUNTED COMMAND CONTROL ANTENNAS S-BAND AND C-BAND BEACON TRANSPONDER ANTENNAS ANTENNA SYSTEMS FOR SPECIFIC MISSILES, PROBES AND SATELLITES,
AD-439 629 DIV. 8

ROCKET CASES
FILAMENT WOUND CONSTRUCTION
STUDY OF THE EFFECTS OF MECHANICAL DAMAGE ON THE PERFORMANCE OF FILAMENT-WOUND MOTOR CASES,
AD-438 195 DIV. 27

ROCKET CASES
STEEL
A COMPARISON OF THE TOUGHNESS CHARACTERISTICS OF D6 AIR AND VACUUM MELT MATERIAL,
AD-439 222 DIV. 17

ROCKET CASES
TITANIUM ALLOYS
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME II. RING ROLLING AND FLOW TURNING CYLINDRICAL SECTIONS,
AD-438 713 DIV. 27
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME IV. FABRICATION AND TESTING OF FULL SCALE COMPONENTS,
AD-438 714 DIV. 27
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE, VOLUME III. DEVELOPMENT OF WELDING PRACTICE,
AD-438 715 DIV. 27
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME V. -EVALUATION OF CANDIDATE TITANIUM ALLOYS,
AD-438 716 DIV. 27
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME I. FORGING OF FRONT AND REAR CLOSURES,
AD-438 815 DIV. 17

ROCKET MOTOR CASES
FILAMENT WOUND CONSTRUCTION
THE STRENGTH OF GLASS FIBERS AND THE FAILURE OF FILAMENT WOUND PRESSURE VESSELS,
AD-439 217 DIV. 14

ROCKET MOTOR NOZZLES
COOLING
SELF-COOLED ROCKET NOZZLES,
AD-439 421 DIV. 27

ROCKET MOTORS (LIQUID PROPELLANT)
FITTINGS
APPLIED RESEARCH AND DEVELOPMENT WORK ON FAMILIES OF BRAZED AND WELDED FITTINGS FOR ROCKET PROPULSION FLUID SYSTEMS,
AD-438 225 DIV. 27

ROCKET MOTORS (SOLID PROPELLANT)
HANDLING
HANDLING AND OPERATING INSTRUCTIONS FOR ROCKET MOTOR X258,
AD-439 834 DIV. 27
WEAPON SYSTEM 133A. SUMMARY OF WING II CASE DESIGN STUDIES,
AD-439 493 DIV. 18

ROCKETS
FIRING TESTS
DYNAMIC FIRING OF THE ZUNI-PADA ROCKET,
AD-439 426 DIV. 28

ROLLER BEARINGS
LUBRICATION

UNSTEADY LIFTING SURFACE THEORY FOR A MARINE PROPELLER OF LOW PITCH ANGLE WITH CHORDWISE LOADING DISTRIBUTION, AD-439 391 DIV. 9

PROPELLERS (MARINE)
PROPELLER BLADES
UNSTEADY LIFTING SURFACE THEORY FOR A MARINE PROPELLER OF LOW PITCH ANGLE WITH CHORDWISE LOADING DISTRIBUTION, AD-439 391 DIV. 9

PROSTHETICS
MOUTH
FOAM MANDIBULAR SPLINT, AD-437 987 DIV. 16

PROTECTIVE COVERINGS
SHELTERS
PROTECTION FACTORS OF EMERGENCY SHELTERS IN A BRITISH RESIDENCE, AD-439 633 DIV. 29

PROTECTIVE COVERINGS
WOOD
OVERLAYS FOR LUMBER--AN OLD PRODUCT IN A NEW DRESS, AD-438 020 DIV. 14

PROTEINS
BIOSYNTHESIS
STUDIES ON DEOXYRIBONUCLEIC ACID METABOLISM, AD-438 682 DIV. 16
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES, AD-438 699 DIV. 16

PSYCHOMETRICS
ATTITUDES
RATINGS BY OFFICER GROUPS OF IMPORTANCE AND OBTAINABILITY OF SELECTED JOB CHARACTERISTICS, AD-437 954 DIV. 28

PSYCHOMETRICS
AVIATION PERSONNEL
YEARS OF EDUCATION AS A PREDICTOR OF TECHNICAL TRAINING SUCCESS, AD-437 940 DIV. 23
SEPARATION OF AVIATION OFFICER CANDIDATES FROM CADETS FOR PURPOSES OF PREDICTING VOLUNTARY WITHDRAWALS, AD-438 639 DIV. 28

PSYCHOMETRICS
MAINTENANCE PERSONNEL
BIBLIOGRAPHY ON MAINTENANCE PERSONNEL PERFORMANCE MEASUREMENT, AD-439 610 DIV. 28

PUBLIC HEALTH
DISEASE VECTORS
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE, VOLUME III, NO. 5, AD-437 929 DIV. 16

PULSE AMPLIFIERS
MANUFACTURING METHODS
STUDY OF MICROCIRCUITRY TECHNIQUES UTILIZING MOLECULAR ENGINEERING, AD-437 949 DIV. 8

PUMPING (ELECTRONICS)
CESIUM
SPIN RELAXATION OF OPTICALLY PUMPED CESIUM, AD-439 436 DIV. 25

PYROTECHNICS
GUERRILLA WARFARE
IMPROVISED PYROTECHNIC MIXTURES FOR GUERRILLA WARFARE APPLICATIONS AD-438 782 DIV. 3

PYROTECHNICS
MARKERS
INVESTIGATION OF THE BURNING CHARACTERISTICS OF THE LEAD DIOXIDE-CUPRIC OXIDE-SILICON STARTER COMPOSITION, AD-437 978 DIV. 3

PYROTECHNICS
SENSITIVITY
SURVEY OF SENSITIVITY CHARACTERISTICS OF TYPICAL DELAY, IGNITER FLASH, AND SIGNAL TYPE PYROTECHNIC COMPOSITIONS, AD-439 383 DIV. 3

QUANTUM MECHANICS
HAMILTONIAN
ON DIRAC'S WAVE EQUATION IN A GRAVITATIONAL FIELD, AD-438 948 DIV. 25

QUINOLINES
GERMICIDES
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS, AD-438 542 DIV. 16
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS, AD-439 312 DIV. 16

RADAR DUPLEXERS
DIODES (SEMICONDUCTORS)
C- AND KU-BAND SEMICONDUCTOR TR DEVICES, AD-438 026 DIV. 8

RADAR DUPLEXERS
DIODES (SEMICONDUCTOR)
SOLID-STATE MICROWAVE TR-ATR SWITCH PRODUCTION ENGINEERING MEASURES PROGRAM, AD-438 858 DIV. 8

RADAR ECHO AREAS
AIR MASS ANALYSIS
CLIMATOLOGICAL STUDY OF RADAR ECHO PICTURES FROM ALBROOK AIR FORCE BASE, PANAMA, AD-438 981 DIV. 2

RADAR INTERFERENCE
THEORY
RADAR INTERFERENCE STUDY, AD-439 263 DIV. 8

RADAR SIGNALS
RESOLUTION
RADAR ACCURACY AND RESOLUTION IN A MULTIPLESIGNAL ENVIRONMENT, AD-437 937 DIV. 8

RADIATION DAMAGE
ELECTRON TUBES
ELECTRON TUBES RADIATION RESISTANT PILOT LINE PRODUCTION, AD-439 240 DIV. 8

RADIATION DAMAGE
LUBRICANTS
EFFECTS OF IRRADIATION AT THREE FLUX LEVELS IN THE GROUND TEST REACTION ON THE WEARLIFE OF SOLID FILM LUBRICANTS, AD-438 132 DIV. 14
EFFECTS OF IRRADIATION AND HIGH TEMPERATURE ON WEAR LIFE OF A CERAMIC BONDED SOLID FILM LUBRICANTS, AD-438 137 DIV. 14

RADIATION DAMAGE
TRANSISTORS
THE TRANSIENT BEHAVIOR OF TRANSISTORS DUE TO IONIZING RADIATION PULSES, AD-438 264 DIV. 8

RADIATION EFFECTS
ABSTRACTS
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS, AD-438 540 DIV. 16
ABSTRACT NO. 23419 TO 23508, PART I, AD-439 340 DIV. 32

RADIATION EFFECTS
BIBLIOGRAPHIES
RADIATION EFFECTS UPON EXPERIMENTAL ANIMALS, MAN, AND PLANTS: AN ANNOTATED BIBLIOGRAPHY, VOL II, M-Z, AD-438 177 DIV. 32
RADIATION EFFECTS UPON EXPERIMENTAL ANIMALS, MAN, AND PLANTS: AN ANNOTATED BIBLIOGRAPHY, VOL. I, A-L, AD-438 176 DIV. 32
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS, AD-439 277 DIV. 16
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS, AD-439 278 DIV. 16

RADIATION EFFECTS
CELLS (BIOLOGY)
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS, AD-438 539 DIV. 16

RADIATION EFFECTS
CHROMOSOMES
EFFECTS OF RADIATIONS ON CELL DIVISION AND CHROMOSOMES IN ANIMALS, AD-438 541 DIV. 16

RADIATION EFFECTS
INDEXES
MONTHLY ACCESSION LIST, COORDINATE INDEX, PART II, ACCESSION LISTS FROM OCTOBER 1, 1963 TO APRIL 30 1964, AD-439 355 DIV. 32

RADIATION EFFECTS
TEST REACTORS
RADIATION EFFECTS PARAMETERS IN NAP APPLICATIONS, AD-439 684 DIV. 20

RADIATION EFFECTS
TISSUES (BIOLOGY)
A QUARTERLY PROGRESS REPORT ON THE EFFECTS OF IONIZING RADIATION, PROTECTIVE OR THERAPEUTIC COMPOUNDS AND EFFECTS OF LOW LEVELS OF GAMMA AND FAST NEUTRON EXPOSURE, AD-438 895 DIV. 16

RADIATION HAZARDS
MEASUREMENT
MEASURING RANGE: FROM 0.4 TO 1,000,000 ROENTGENS PER MINUTE, AD-439 595 DIV. 20

RADIATION HAZARDS
NUCLEAR REACTORS
MOLLY-G REACTOR, AD-438 955 DIV. 20

RADIO ASTRONOMY
STARS
THE DETERMINATION OF THE ACCURATE POSITIONS OF RADIO STARS BY THE LUNAR OCCULTATION TECHNIQUE, OBSERVATIONS OF GALACTIC AND EXTRA-GALACTIC EMISSION AT 408 MC/S, AD-439 350 DIV. 2

RADIO COMMUNICATION SYSTEMS
GUIDED MISSILES
WS-133B MINUTEMAN GROUND ELECTRONICS SYSTEM FIGURE A 14125, RADIO SET AN/GRC-128, DETAILED TEST REQUIREMENTS FOR EVALUATION TEST PROGRAM, AD-438 054 DIV. 12

RADIO INTERFERENCE
ATMOSPHERE ENTRY
DESIGN OF A UHF RADIMETER FOR PLASMA MEASUREMENTS, AD-438 222 DIV. 8

RADIO INTERFEROMETERS
PERFORMANCE (ENGINEERING)
MILLSTONE HILL RADAR STATION RESULTS OF LONG BASELINE RADAR INTERFEROMETER STUDIES, AD-438 425 DIV. 4

RADIO RECEIVERS
AMPLITUDE MODULATION
AUDIO PULSE CANCELLATION FILTER, AD-438 133 DIV. 8

RADIO RECEIVERS
MICROWAVE EQUIPMENT
ELECTRONIC EQUIPMENT INTERFERENCE CHARACTERISTICS-COMMUNICATION TYPE, AD-439 503 DIV. 8

RADIO RECEIVERS
RADIOFREQUENCY FILTERS
ACTIVE NOTCH FILTER, AD-438 252 DIV. 5

RADIO TRANSMISSION
GUIDED MISSILES (SURFACE-TO-SURFACE)
TEST REPORT ON 465L/TITAN II RADIO TRANSMISSION INTERFACE, AD-439 433 DIV. 12

RADIO TRANSMITTERS
PORTABLE
STUDY OF UNPOWERED PERSONNEL TRANSMITTER TECHNIQUES, AD-439 830 DIV. 8

RADIO WAVES
REFLECTION
RADIO-ECHO STUDIES OF METEORS AT 68-CM WAVELENGTH, PART I: SPORADIC METEORS, AD-439 354 DIV. 2

RADIOACTIVE FALLOUT
SHELTERS
PROTECTION FACTORS OF EMERGENCY SHELTERS IN A BRITISH RESIDENCE, AD-439 332 DIV. 20

RADIOACTIVITY
SAFETY
RADIOLOGICAL SAFETY MANUAL, AD-438 147 DIV. 20

RADIOFREQUENCY AMPLIFIERS
ELECTRON TUBES
DESIGN AND DEVELOPMENT INVESTIGATION OF A LOW NOISE, LINEAR, VARIABLE GAIN, R.F. AMPLIFIER TUBE, AD-438 401 DIV. 8

RADIOFREQUENCY FILTERS
RADIO INTERFERENCE
ACTIVE NOTCH FILTER, AD-438 252 DIV. 5

RADIOFREQUENCY FILTERS
RADIO RECEIVERS
AUDIO PULSE CANCELLATION FILTER, AD-438 133 DIV. 8

RADIOFREQUENCY INTERFERENCE
ANTENNAS
DERIVATION OF AEROSPACE ANTENNA COUPLING-FACTOR INTERFERENCE PREDICTION TECHNIQUES, AD-438 208 DIV. 8

RADIOFREQUENCY INTERFERENCE
DETECTION
RF HAZARD DETECTOR ADAPTED TO THE LITTLEJOHN MISSILE SYSTEM, AD-437 919 DIV. 22

RADIOFREQUENCY INTERFERENCE
RADIO RECEIVERS
AUDIO PULSE CANCELLATION FILTER, AD-438 133 DIV. 8

RADIOFREQUENCY INTERFERENCE
SCIENTIFIC RESEARCH
INTERFERENCE STUDIES, AD-438 722 DIV. 8

RADIOFREQUENCY INTERFERENCE
TEST SETS
RADIO INTERFERENCE MEASURING SET AN/TRM-6(XA-3), AD-437 907 DIV. 30

RADIOFREQUENCY INTERFERENCE
TRANSPONDERS
SPECTRUM SIGNATURE OF TRANSPONDER SET AN/APX-25, AD-437 936 DIV. 5

RADIOFREQUENCY PULSES
HAZARDS

IN THE MOLECULES,
AD-439 960 DIV. 4

SILVER COMPOUNDS
OXIDES
THE FORMATION OF THIN ANODIC FILMS OF SILVER OXIDE,
AD-438 188 DIV. 4

SIMULATION
PROGRAMMING (COMPUTERS)
SIMULATION SYSTEM PROGRAMMING DESIGN MANUAL,
AD-439 418 DIV. 30

SIMULATION
WIRE
SIMULATION OF A THIN PLASMA SHEATH BY A PLANE OF WIRES,
AD-439 244 DIV. 25

SINGLE CRYSTALS
EUROPIUM COMPOUNDS
GROWTH AND CHARACTERIZATION OF SINGLE CRYSTALS OF RARE EARTH COMPOUNDS,
AD-438 516 DIV. 25

SKY
ILLUMINATION
SKY ILLUMINATION DURING ECLIPSE, ANNOTATED BIBLIOGRAPHY OF SOVIET-BLOC LITERATURE FOR THE PERIOD 1940-1963,
AD-439 226 DIV. 2

SKY BRIGHTNESS
NIGHT SKY
REPRINT OF IRISH PAPER ON CHEMICAL REACTIONS CONTRIBUTING TO NIGHTGLOW,
AD-439 651 DIV. 2

SLEEP
ELECTROENCEPHALOGRAPHY
MATURATION OF ELECTROENCEPHALOGRAPH EVOKED POTENTIALS,
AD-437 930 DIV. 14
REPORTED VISUAL SENSATIONS AS A FUNCTION OF SUSTAINED SENSORY DEPRIVATION AND SOCIAL ISOLATION,
AD-439 431 DIV. 28

SLENDER BODIES
GAS FLOW
A METHOD OF DETERMINING FLOW FIELDS OF BLUNT NOSED SLENDER BODIES AT ARBITRARY ANGLES OF YAW,
AD-439 008 DIV. 9

SLENDER BODIES
WAKE
EXPERIMENTAL DETERMINATION OF PRESSURE, TEMPERATURE, AND DENSITY IN SOME LAMINAR HYPERSONIC NEAR WAKES,
AD-439 642 DIV. 9

SOCIAL COMMUNICATION
GROUP DYNAMICS
PIONEER VI. CONFORMITY TO A GROUP NORM AS A FUNCTION OF SENSORY DEPRIVATION AND SOCIAL ISOLATION,
AD-439 430 DIV. 28

SOIL MECHANICS
ELASTICITY
THEORETICAL STUDY OF ENERGY DISTRIBUTION IN A HALF-SPACE RESULTING FROM DYNAMIC LOADING IN A DEPRESSION AT THE ORIGIN,
AD-438 711 DIV. 20

SOIL MECHANICS
THEORY
A THEORETICAL ANALYSIS OF STRESS WAVE INTERACTION IN A MODEL SOIL -FURTHER STUDIES,
AD-439 382 DIV. 13

SOILS
STRAIN GAGES
DEVELOPMENT OF A SOIL STRAIN GAGE FOR LABORATORY DYNAMIC TESTS,
AD-438 826 DIV. 30

SOILS
VISCOELASTICITY
A MACHINE PROGRAM FOR COMPUTING NONLINEAR VISCOELASTIC WAVE PROPAGATION IN SOILS,
AD-438 168 DIV. 2

SOLAR CELLS
FILMS
RESEARCH ON THIN FILM POLY-CRYSTALLINE SOLAR CELLS,
AD-438 526 DIV. 7

SOLAR CELLS
MANUFACTURING METHODS
HIGH EFFICIENCY SILICON SOLAR CELLS REPORT NUMBER VI,
AD-439 942 DIV. 7

SOLAR CELLS
SCIENTIFIC RESEARCH
RESEARCH ON PHOTOVOLTAIC CELLS,
AD-439 672 DIV. 8

SOLAR CORONA
ANALYSIS
METEOROLOGICAL EQUIPMENT FOR STUDY OF SOLAR CORONA,
AD-438 949 DIV. 2

SOLAR FLARES
MATHEMATICAL PREDICTION
FLARE PREDICTION FROM SOLAR LIMB OBSERVATIONS,
AD-439 482 DIV. 2

SOLAR FURNACES
PANELS (STRUCTURAL)
STUDY, DESIGN, AND FABRICATION OF SOLAR ENERGY CONCENTRATOR MODELS,
AD-439 838 DIV. 25

SOLAR SYSTEMS
THEORY
ANGULAR MOMENTUM FLUX IN THE FORMATION OF THE SOLAR SYSTEM,
AD-438 007 DIV. 2
SOLID PROPELLANT MECHANICAL PROPERTIES INVESTIGATIONS,
AD-439 403 DIV. 10

SOLID STATE PHYSICS
MASERS
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM,
AD-439 695 DIV. 25

SOLID STATE PHYSICS
MICROWAVES
SOLID-STATE MICROWAVE RESEARCH,
AD-437 935 DIV. 25

SOLID STATE PHYSICS
SCIENTIFIC RESEARCH
LINCOLN LABORATORY QUARTERLY PROGRESS REPORT - SOLID STATE (DIVISION 8),
AD-439 365 DIV. 25
SOLID STATE PHYSICS,
AD-439 686 DIV. 25

SOLIDS
DEFORMATION
CONSTITUTIVE EQUATIONS OF VISCOELASTIC SOLIDS UNDER FINITE DEFORMATION,
AD-439 685 DIV. 25

SOLIDS
ELASTICITY
INSTABILITY OF THICK ELASTIC SOLIDS,
AD-439 328 DIV. 25

SONAR DOMES
STRESSES
EXPERIMENTAL DETERMINATION OF PRESSURE AND STRAIN ON THE BOW SONAR DOME OF USS BARRY (DD 933),
AD-438 854 DIV. 31

SORPTION
PHOSPHORUS
ADSORPTION AND SORPTION COMPLEXES,
AD-439 607 DIV. 4

SOUND
PROPAGATION
SYSTEMATIC ERRORS IN ULTRASONIC PROPAGATION PARAMETER MEASUREMENTS, PART I. EFFECT OF FREE FIELD DIFFRACTION,
AD-437 995 DIV. 25

SOUND TRANSMISSION
NUMERICAL ANALYSIS
RADIATION OF SOUND FROM A CIRCULAR DISK WITH A UNIFORM PRESSURE DISTRIBUTION,
AD-439 374 DIV. 25

SOUNDING ROCKETS
TERMINAL BALLISTICS
AN EMPIRICAL TECHNIQUE FOR IMPROVING AEROBEE-HI IMPACT PREDICTIONS,
AD-439 451 DIV. 22

SPACE COMMUNICATION SYSTEMS
TRANSPONDERS
TRACKING, TELEMETRY, AND COMMAND STUDIES OF GROUND AND SATELLITE SUBSYSTEMS, VOLUME IV: AIRBORNE TRANSPONDER CONFIGURATION STUDY,
AD-438 031 DIV. 5

SPACE CRAFT
LOGISTICS
SOME SELECT PHYSIOLOGICAL, ANTHROPOMETRIC, AND HUMAN ENGINEERING DATA USEFUL IN VEHICLE DESIGN AND LOGISTIC PROBLEMS OF SPACE FLIGHT OPERATIONS,
AD-438 231 DIV. 16

SPACE ENVIRONMENTAL CONDITIONS
MODELS (SIMULATIONS)
AEROSPACE ENVIRONMENT SIMULATOR,
AD-438 047 DIV. 16

SPACE FLIGHT
DISARMAMENT
SPACE ARMS CONTROL: TRENDS, CONCEPTS, PROSPECTS,
AD-438 436 DIV. 18

SPACE FLIGHT
OPERATIONS
SOME SELECT PHYSIOLOGICAL, ANTHROPOMETRIC, AND HUMAN ENGINEERING DATA USEFUL IN VEHICLE DESIGN AND LOGISTIC PROBLEMS OF SPACE FLIGHT OPERATIONS,
AD-438 231 DIV. 16

SPACE FLIGHT
SCIENTIFIC RESEARCH
COSMIC RESEARCH (KOSMICHESKIYE ISSLEDOVANIYA),
AD-439 330 DIV. 2

SPACECRAFT CABINS
SIMULATORS
MICROBIOLOGIC STUDIES OF THE TWO-MAN SPACE CABIN SIMULATOR, INTERCHANGE OF ORAL AND INTESTINAL BACTERIA,
AD-439 097 DIV. 16

SPALLATION
THEORY
STUDIES OF THE THEORY OF SPALLATION,
AD-438 838 DIV. 25

SPECIFICATIONS
HANDBOOKS
REFERENCE MANUAL ON TENTAGE,
AD-438 008 DIV. 29

SPECTRUM ANALYZERS
DESIGN
RF SPECTRUM ANALYZER,
AD-438 196 DIV. 8

SPECTRUM ANALYZERS
RADIOFREQUENCY
RF SPECTRUM ANALYZER,
AD-439 009 DIV. 8

SPECTRUM ANALYZERS
SPEECH
SPEECH COMMUNICATION RESEARCH,
AD-439 617 DIV. 30

SPEECH
ANALYSIS
SPEECH COMMUNICATION RESEARCH,
AD-439 617 DIV. 30

SPHERES
FRACTURE (MECHANICS)
RUPTURE SURFACES OF THICK SPHERICAL SHELL UNDER INTERNAL PRESSURE,
AD-439 018 DIV. 25

STABILIZATION SYSTEMS
TELEVISION EQUIPMENT
A COMPARATIVE SURVEY OF TYPES OF SPACE STABILIZATION FOR TELEVISION SYSTEMS,
AD-439 511 DIV. 12

STAINLESS STEEL
MECHANICAL PROPERTIES
MECHANICAL PROPERTIES OF 17-4PH STEEL, HOMOGENIZED VERSUS AS RECEIVED CONDITION,
AD-438 142 DIV. 17

STAPHYLOCOCCUS
ANTIBIOTICS
STUDIES ON THE MODE OF ACTION OF ANTIBACTERIAL DRUGS,
AD-439 311 DIV. 16

STARS
RADIO ASTRONOMY
THE DETERMINATION OF THE ACCURATE POSITIONS OF RADIO STARS BY THE LUNAR OCCULTATION TECHNIQUE, OBSERVATIONS OF GALACTIC AND EXTRA-GALACTIC EMISSION AT 408 MC/S,
AD-439 350 DIV. 2

STATISTICAL FUNCTIONS
TOPOLOGY
NON-PARAMETRIC MAXIMUM LIKELIHOOD ESTIMATION,
AD-439 259 DIV. 15

STATISTICAL PROCESSES
SEQUENTIAL ANALYSIS
SOME THEOREMS ON FUNCTIONALS OF MARKOV CHAINS,
AD-438 439 DIV. 18

STEEL
FRACTURE (MECHANICS)
STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS,
AD-437 965 DIV. 17

STEEL
MECHANICAL PROPERTIES
MATERIAL EVALUATION OF D6AC STEEL EXTRUSION MECHANICAL AND METALLURGICAL PROPERTIES OF,
AD-438 779 DIV. 17
THERMOMECHANICAL TREATMENTS APPLIED TO ULTRAHIGH STRENGTH BAINITES,
AD-439 231 DIV. 17
PROPERTIES OF ULTRA-HIGH STRENGTH BAINITIC STRUCTURES,
AD-439 842 DIV. 17

STEEL
TOUGHNESS
A COMPARISON OF THE TOUGHNESS CHARACTERISTICS OF D6 AIR AND VACUUM MELT MATERIAL,
AD-439 222 DIV. 17

STEEL
WELDS
CRACKING IN HIGH-STRENGTH STEEL WELDMENTS --A CRITICAL REVIEW,
AD-438 432 DIV. 26

STEREOCHEMISTRY
POLYCYCLIC COMPOUNDS
FACTORS INVOLVED IN THE STABILITY

INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS,
AD-439 606 DIV. 26

ROLLING (METALLURGY)
ULTRASONIC RADIATION
STUDY OF THE FEASIBILITY OF APPLYING ULTRASONIC ENERGY TO THE ROLLING PROCESS FOR SHEET METALS,
AD-438 937 DIV. 26

SAFETY DEVICES
PROJECTILES
ANALYSIS AND DESIGN ROTARY-TYPE SETBACK LEAF S+A MECHANISMS,
AD-439 337 DIV. 22

SALMONELLA
DYSENTERY
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS,
AD-439 294 DIV. 16

SALMONELLA
INFECTIONS
CORRELATION BETWEEN SUSCEPTIBILITY TO ORAL INFECTION AND INTESTINAL BACTERIAL FLORA IN THE INBRED MOUSE STRAINS RAISED BY SELECTIVE BROTHER-SISTER MATINGS IN OUR LABORATORY,
AD-438 691 DIV. 16

SALMONELLA
PARTICLES
GENETIC ANALYSIS OF MICROORGANISH BY MIXED INFECTION OF ACTIVE PHAGE PARTICLES AND PHAGE OR BACTERIAL DNA,
AD-439 065 DIV. 16

SALMONELLA TYPHOSA
DYSENTERY
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS),
AD-439 293 DIV. 16
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS),
AD-439 295 DIV. 16

SANDWICH CONSTRUCTION
EXPANDED PLASTICS
MATERIAL -HRP -3/8 OX AND 3/4 OX HEXCEL FOAM FILLED CORE -SHEAR STRENGTH AND SHEAR MODULUS DETERMINATION OF,
AD-438 136 DIV. 14

SANDWICH PANELS
ADHESIVES
CREEP RUPTURE TESTS OF AEROBOND 500 AND DYNABOND 132 ADHESIVES,
AD-438 141 DIV. 14

SANDWICH PANELS
BONDING
MATERIAL -ADHESIVE -DYNABOND 132 -ADDITIONAL TESTING AND DISPOSITION OF SPECIMENS REMAINING FROM 420 F CREEP TEST (SO-2895),
AD-438 781 DIV. 14

SATELLITES (ARTIFICIAL)
GEODESICS
A SUMMARY OF CONFIGURATION DESIGN STUDIES FOR A RANGE INSTRUMENTATION CALIBRATION SATELLITE,
AD-439 358 DIV. 12

SATELLITES (ARTIFICIAL)
GUIDED MISSILE RANGES
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE,
AD-438 872 DIV. 12
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE,
AD-438 873 DIV. 12
A SATELLITE-BORNE XENON FLASH OPTICAL BEACON FOR USE ON THE PROPOSED MISSILE RANGE CALIBRATION SATELLITE,
AD-438 874 DIV. 12

SATELLITES (ARTIFICIAL)
SPACE MAINTENANCE
DEVELOPMENT PLAN AND COST ESTIMATE. ADDENDUM TO A STUDY OF AN ORBITAL MAINTENANCE AND MATERIAL TRANSFER SHUTTLE,
AD-438 028 DIV. 12

SAWS
WOOD
SOME ASPECTS OF SAWING ACCURACY IN CIRCULAR MILLS,
AD-438 013 DIV. 26

SCALERS
TRANSISTORS
TRANSISTOR FLIP-FLOP AND RING COUNTER WITH NONVOLATILE MEMORY,
AD-439 223 DIV. 8

SCATTERING
RELATIVITY THEORY
RELATIVISTIC PARTICLE DYNAMICS AND THE S-MATRIX,
AD-439 077 DIV. 25

SCATTERING
THEORY
THEORETICAL INVESTIGATIONS OF SCATTERING FROM PLASTIC FOAMS,
AD-437 900 DIV. 8
ABSTRACTS OF USAPRO RESEARCH PUBLICATIONS--FY 1963,
AD-438 846 DIV. 30

SCIENTIFIC RESEARCH
ANALYSIS
SEPARATING RESEARCH FROM RESEARCH AND DEVELOPMENT,
AD-439 524 DIV. 30

SCIENTIFIC RESEARCH
JAPAN
EXPLORATION OF NEW CHEMOTHERAPEUTI FOR INFECTIOUS DISEASES,
AD-439 315 DIV. 4

SCIENTIFIC RESEARCH
REPORTS
PROGRESS REPORT FOR DEC. 1963 THRU FEB. 1964 FOR COORDINATED SCIENCE LAB., U. OF ILLINOIS,
AD-438 840 DIV. 25

SCIENTIFIC RESEARCH
ROCKET ANTENNAS
FLUSH AND NONFLUSH MOUNTED TELEMETRY ANTENNAS FLUSH MOUNTED COMMAND CONTROL ANTENNAS S-BAND AND C-BAND BEACON TRANSPONDER ANTENNAS ANTENNA SYSTEMS FOR SPECIFIC MISSILES, PROBES AND SATELLITES,
AD-439 629 DIV. 8

SEALS (STOPPERS)
FUEL CELLS
RESEARCH AND DEVELOPMENT OF AN ADVANCED LABORATORY LIQUID METAL REGENERATIVE FUEL CELL,
AD-438 519 DIV. 7

SEISMOLOGICAL STATIONS
HANDBOOKS
HANDBOOK: WORLD-WIDE STANDARD SEISMOGRAPH NETWORK,
AD-439 691 DIV. 2

SEMICONDUCTOR DEVICES
HALL EFFECT
APPLICATIONS OF THE HALL EFFECT SEMICONDUCTOR MULTIPLIER,
AD-439 618 DIV. 12

SEMICONDUCTOR DEVICES
TRANSISTORS
PRODUCTION ENGINEERING MEASURE, PRODUCTION DEVELOPMENT OF A SILICON PLANAR EPITAXIAL TRANSISTOR WITH A MAXIMUM OPERATING FAILURE RATE OE 0.001% PER 1000 HOURS AT A CONFIDENCE LEVEL OF 90% AT 25C.
AD-437 946 DIV. 8
TRANSISTOR, VHF, SILICON, POWER (10W-500MC),
AD-439 230 DIV. 8

SEMICONDUCTORS
SCIENTIFIC RESEARCH
P-N JUNCTION FORMATION TECHNIQUES,
AD-438 515 DIV. 25
SEMICONDUCTOR RESEARCH,
AD-439 233 DIV. 25

SEMICONDUCTORS
THERMOELECTRICITY
THERMOELECTRIC MATERIALS,
AD-439 683 DIV. 25

SENSORY DEPRIVATION
SOCIAL COMMUNICATION
PIONEER VI. VIGILANCE AS A FUNCTION OF SENSORY DEPRIVATION AND SOCIAL ISOLATION,
AD-439 432 DIV. 28

SENSORY DEPRIVATION
VISION
REPORTED VISUAL SENSATIONS AS A FUNCTION OF SUSTAINED SENSORY DEPRIVATION AND SOCIAL ISOLATION,
AD-439 431 DIV. 28

SEPARATION
COBALT COMPOUNDS
STUDY OF OXIDES FOR O2 -N2 SEPARATION,
AD-438 163 DIV. 4

SHELTERS
CIVIL DEFENSE SYSTEMS
SHELTER OCCUPANCY STUDIES AT THE UNIVERSITY OF GEORGIA, 1962-1963,
AD-439 251 DIV. 18
SHELTER OCCUPANCY STUDIES AT THE UNIVERSITY OF GEORGIA, 1962-1963,
AD-439 396 DIV. 18

SHELTERS
EXPANDED PLASTICS
RIGID FOAM PLASTICS SHELTERS BY SPRAY APPLICATION TO AIR-SUPPORTED MOLDS,
AD-437 901 DIV. 14

SHELTERS
GREAT BRITAIN
PROTECTION FACTORS OF EMERGENCY SHELTERS IN A BRITISH RESIDENCE,
AD-439 633 DIV. 29

SHIGELLA FLEXNERI
DYSENTERY
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL INFECTIONS),
AD-439 292 DIV. 16
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS),
AD-439 293 DIV. 16
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS,
AD-439 294 DIV. 16

SHIGELLA SONNEI
AGGLUTININS
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL ENTERIC INFECTIONS),
AD-438 745 DIV. 16

SHIGELLA SONNEI
DYSENTERY
BACTERIOLOGICAL, IMMUNOLOGICAL AND VIRAL STUDIES ON RECTAL MUCUS IN ENTERIC INFECTIONS (SHIGELLOSIS, SALMONELLOSIS, PATHOGENIC COLI INFECTIONS AND VIRAL INFECTIONS),
AD-439 292 DIV. 16

SHIP AUXILIARY EQUIPMENT
VIBRATION ISOLATORS
DEVELOPMENT OF AUTOMATICALLY HARDENING SHOCK MOUNTS,
AD-438 143 DIV. 31

SHIPS
WAKE
ANALYSIS OF WAKE SURVEY OF SHIP MODELS COMPUTER PROGRAM AML PROBLEM NO. 840-219F,
AD-438 855 DIV. 14

SHOCK TUBES
LINE SPECTRUM
TEMPERATURE MEASUREMENTS FOR SHOCK HEATED POWDERED SOLIDS,
AD-438 259 DIV. 25

SHOCK WAVES
AIR
INTERACTION OF ONE-DIMENSIONAL SHOCKS FOR EQUILIBRIUM AIR,
AD-439 587 DIV. 22

SHOCK WAVES
MAGNETOHYDRODYNAMICS
A MAGNETIC COMPRESSION EXPERIMENT FOR THE STUDY OF SHOCK WAVE STRUCTURES,
AD-437 941 DIV. 25

SHOCK WAVES
PLASMA MEDIUM
EXCITATION OF PLASMA OSCILLATIONS BY SHOCK WAVES,
AD-439 209 DIV. 25

SHOCK (MECHANICS)
HORN ANTENNAS
SHOCK TUBE TEST OF A HORN ANTENNA,
AD-439 833 DIV. 8

SHORT TAKE-OFF PLANES
SIMULATION
SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT, VOLUME II. V/STOL ANALYSIS REPORT,
AD-438 926 DIV. 9

SIGNALS
ULTRASONIC RADIATION
ORTHOGONAL ULTRASONIC SIGNALS,
AD-438 036 DIV. 6

SILICON COMPOUNDS
CAPACITORS
PRODUCTION ENGINEERING MEASURE FOR THE PRODUCTION OF SILICON MONOXIDE CAPACITORS MICROELEMENT,
AD-439 486 DIV. 8

SILICON COMPOUNDS
POLYMERIZATION
SYNTHESIS OF LINEAR AND CYCLOLINEAR ORGANOSILICON COMPOUNDS WITH PHENYLENESILOXANE CHAINS IN THE MOLECULES,
AD-437 960 DIV. 4

SILOXANES
SYNTHESIS (CHEMISTRY)
SYNTHESIS OF LINEAR AND CYCLOLINEAR ORGANOSILICON COMPOUNDS WITH PHENYLENESILOXANE CHAINS

THERMAL PROPERTIES
REFRACTORY MATERIALS
CARBONIZATION OF PLASTICS AND REFRACTORY MATERIAL RESEARCH, VOLUME II. REFRACTORY MATERIALS,
AD-438 050 DIV. 14

THERMIONIC CONVERTERS
GENERATORS
LIQUID METAL-HEATED SPACE RADIATOR-MOUNTED THERMIONIC GENERATOR,
AD-439 926 DIV. 7

THERMIONIC CONVERTERS
PRODUCTION
HIGH TEMPERATURE SOLAR THERMIONIC GENERATORS,
AD-439 652 DIV. 7

THERMITE
WELDING
THERMIT WELDING: A SELECTIVE BIBLIOGRAPHY,
AD-439 946 DIV. 26

THERMOCOUPLES
HYPERSONIC FLOW
THE EQUILIBRIUM TEMPERATURE PROBE. A DEVICE FOR MEASURING TEMPERATURES IN HYPERSONIC BOUNDARY LAYERS,
AD-439 624 DIV. 30

THERMOELECTRICITY
SEMICONDUCTORS
THERMOELECTRIC MATERIALS,
AD-439 683 DIV. 25

THERMOPLASTICS
SYNTHESIS (CHEMISTRY)
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES,
AD-438 187 DIV. 4

THIN FILMS (STORAGE DEVICES)
SUPERCONDUCTIVITY
SUPERCONDUCTIVE EFFECTS IN THIN FILMS,
AD-439 221 DIV. 25

THORAX
CARDIOVASCULAR SYSTEM
THORACIC CAGE IMPEDANCE MEASUREMENT IMPEDANCE PLETHYSMOGRAPHIC DETERMINATION OF CARDIAC OUTPUT (A COMPARATIVE STUDY),
AD-439 088 DIV. 14

THROAT
ELECTRICAL IMPEDANCE
THORACIC CAGE IMPEDANCE MEASUREMENT IMPEDANCE PLETHYSMOGRAPHIC DETERMINATION OF CARDIAC OUTPUT (A COMPARATIVE STUDY),
AD-439 088 DIV. 14

THROAT
SKIN
THORACIC CAGE IMPEDANCE MEASUREMENT TISSUE RESISTIVITY IN VIVO AND TRANSTHORACIC IMPEDANCE AT 100 KC,
AD-439 353 DIV. 14

THYMUS
NUCLEOTIDYL TRANSFERASES
METABOLIC FUNCTION OF EDOXYNUCLEOSIDIC COMPOUNDS,
AD-438 742 DIV. 16

THYRATRONS
HYDROGEN
PRODUCTION ENGINEERING MEASURE FOR TYPE 7890 SUPER POWER HYDROGEN THYRATRON,
AD-439 241 DIV. 8

THYROID GLAND
BIOCHEMISTRY
ON THE EFFECT OF NEUROHYPOPHYSIAL HORMONE ON THYROID ACTIVITY,
AD-439 060 DIV. 16

THYROID GLAND
HORMONES
EFFECT OF NEUROHYPOPHYSIAL HORMONE ON THYROID ACTIVITY,
AD-439 055 DIV. 16
ON THE EFFECT OF NEUROHYPOPHYSIAL HORMONE ON THYROID ACTIVITY,
AD-439 060 DIV. 16

THYROID GLAND
PITUITARY HORMONES
ON THE EFFECT OF NEUROHYPOPHYSIAL HORMONE ON THYROID ACTIVITY,
AD-439 061 DIV. 16

TISSUES (BIOLOGY)
PATHOLOGY
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY,
AD-438 531 DIV. 14
STUDIES ON THE MECHANISM OF CELL DAMAGES IN LIVER AND KIDNEY CELLS AND IN HEART MUSCLE FIBERS AS REVEALED BY ELECTRON MICROSCOPY,
AD-438 532 DIV. 14

TITANIUM ALLOYS
MECHANICAL PROPERTIES
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE. VOLUME V. -EVALUATION OF CANDIDATE TITANIUM ALLOYS,
AD-438 716 DIV. 27

TITANIUM ALLOYS
METAL SPINNING
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE, VOLUME II, RING ROLLING AND FLOW TURNING CYLINDRICAL SECTIONS,
AD-438 713 DIV. 27

TITANIUM ALLOYS
ROCKET CASES
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE, VOLUME I, FORGING OF FRONT AND REAR CLOSURES,
AD-438 815 DIV. 17

TITANIUM ALLOYS
WELDING
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE, VOLUME III, DEVELOPMENT OF WELDING PRACTICE,
AD-438 715 DIV. 27

TOPOLOGY
INTEGRALS
OBSTRUCTIONS TO IMPOSING DIFFERENTIABLE STRUCTURES,
AD-438 546 DIV. 15

TOPOLOGY
STATISTICAL DISTRIBUTIONS
NON-PARAMETRIC MAXIMUM LIKELIHOOD ESTIMATION,
AD-439 259 DIV. 15

TOWED SONAR
ECHO RANGING
LATERAL ECHO SOUNDER -MODEL CL-1,
AD-437 905 DIV. 6

TOXOPLASMA
MORPHOLOGY (BIOLOGY)
BIOLOGICAL AND IMMUNOLOGICAL STUDIES ON TOXOPLASMA,
AD-438 741 DIV. 14

TRAINING
FEASIBILITY STUDIES
THE EVALUATION OF TROUBLESHOOTING STRATEGIES,
AD-438 924 DIV. 23

TRAINING
GREAT BRITAIN
APPRENTICESHIP IN GREAT BRITAIN AND THE UNITED STATES,
AD-438 680 DIV. 23

TRAINING
UNITED STATES
APPRENTICESHIP IN GREAT BRITAIN AND THE UNITED STATES,
AD-438 680 DIV. 23

TRAINING DEVICES
GROUP DYNAMICS
A COMPARISON OF MODES OF PRESENTATION OF PAIRED ASSOCIATES ON THE SUBJECT-MATTER TRAINER,
AD-439 648 DIV. 23

TRAJECTORIES
OPTIMIZATION
A STUDY OF OPTIMIZATION TECHNIQUES,
AD-438 980 DIV. 15

TRANSCENDENTAL FUNCTIONS
INTEGRALS
ECONOMIZATION OF INTEGRALS OF TRANSCENDENTAL FUNCTIONS,
AD-439 012 DIV. 18
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS,
AD-439 694 DIV. 8

TRANSISTORS
MANUFACTURING METHODS
PRODUCTION ENGINEERING MEASURE, RELIABILITY THRU PROCESS IMPROVEMENT (2N1506),
AD-437 914 DIV. 8

TRANSISTORS
PRODUCTION
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N328A TRANSISTOR,
AD-439 408 DIV. 24

TRANSISTORS
RADIATION DAMAGE
THE TRANSIENT BEHAVIOR OF TRANSISTORS DUE TO IONIZING RADIATION PULSES,
AD-438 264 DIV. 8

TRANSISTORS
SCALERS
TRANSISTOR FLIP-FLOP AND RING COUNTER WITH NONVOLATILE MEMORY,
AD-439 223 DIV. 8
TRANSISTOR, VHF, SILICON POWER (10W-500MC),
AD-439 230 DIV. 8

TRANSPONDERS
RADIOFREQUENCY SPECTROSCOPY
SPECTRUM SIGNATURE OF TRANSPONDER SET AN/APX-25,
AD-437 936 DIV. 5

TRANSPONDERS
SATELLITES (ARTIFICIAL)
RESEARCH DIRECTED TOWARD THE INVESTIGATION OF SUITABILITY OF THE GLOTRAC TYPE G TRANSPONDER FOR USE IN THE RANGE CALIBRATION SATELLITE,
AD-438 936 DIV. 6

TRANSPONDERS
SPACEBORNE
TRACKING, TELEMETRY, AND COMMAND STUDIES OF GROUND AND SATELLITE SUBSYSTEMS, VOLUME IV: AIRBORNE TRANSPONDER CONFIGURATION STUDY,
AD-438 031 DIV. 5

TRANSPORTATION
ECONOMICS
TECHNICAL STUDIES IN TRANSPORTATION: TRANSPORTATION COST FINDING,
AD-438 146 DIV. 33

TRAVELING-WAVE TUBES
MICROWAVE AMPLIFIERS
DESIGN FOR A HOLLOW-BEAM, DISC-LOADED, COAXIALLINE, TRAVELING-WAVE AMPLIFIER,
AD-438 253 DIV. 8

TREMATODES
EPIDEMIOLOGY
AN EPIDEMIOLOGIC SURVEY OF PARAGONIMUS WESTERMANI (KERBERT, 1878) AND RELATED SPECIES IN TAIPEI COUNTY, TAIWAN,
AD-439 643 DIV. 14

TREMATODES
PERIODIC VARIATIONS
SEASONAL VARIATIONS IN THE INCIDENCE OF PARAGONIMUS WESTERMANI INFECTION IN ERIOCHEIR JAPONICUS,
AD-438 639 DIV. 14

TRIODES
PRODUCTION
7486 CERAMIC TRIODE PRODUCTION ENGINEERING MEASURE,
AD-439 494 DIV. 8

TUNGSTEN
OXIDATION
KINETIC AND AERODYNAMIC ASPECTS OF THE OXIDATION OF METALS BY PARTIALLY DISSOCIATED OXYGEN,
AD-438 927 DIV. 4

TUNING DEVICES
MODULES (ELECTRONICS)
LOW COST ARMY MICROMODULE PROGRAM,
AD-439 238 DIV. 8

TUNNEL DIODES
MICROWAVE OSCILLATORS
A 10-MW, X-BAND TUNNEL-DIODE OSCILLATOR,
AD-438 192 DIV. 8

TUNNELING (ELECTRONICS)
CATHODES (ELECTRON TUBES)
THIN-FILM COLD CATHODES FOR MICROWAVE TUBES,
AD-438 938 DIV. 8

TURBULENCE
DIFFUSION
TURBULENT DIFFUSION OF HEAT AND MOMENTUM IN A HOMOGENEOUS AND ISOTROPIC TURBULENT STREAM,
AD-439 507 DIV. 9

TURBULENT BOUNDARY LAYER
MATHEMATICAL PREDICTION
THE BEHAVIOR OF TURBULENT BOUNDARY LAYERS IN ADVERSE PRESSURE GRADIENTS,
AD-438 000 DIV. 9

TURBULENT BOUNDARY LAYER
SOUND
SURFACE AND VOLUME SOUND FROM BOUNDARY LAYERS,
AD-439 404 DIV. 25

ULTRASONIC RADIATION
MATERIAL FORMING
EFFECTS OF ULTRASOUND ON DEFORMATION CHARACTERISTICS OF STRUCTURAL METALS,
AD-439 384 DIV. 17

ULTRASONIC RADIATION
MUSCLES
ELECTRON MICROSCOPE STUDY OF ULTRASONICALLY IRRADIATED MUSCLE,
AD-438 641 DIV. 14

ULTRASONIC RADIATION
SIGNALS
ORTHOGONAL ULTRASONIC SIGNALS,
AD-438 035 DIV. 6
ORTHOGONAL ULTRASONIC SIGNALS,
AD-438 036 DIV. 6

ULTRASONIC RADIATION
STRESSES
THE USE OF ULTRASONIC WAVES FOR STRESS DETERMINATIONS,
AD-438 949 DIV. 25

UNDERWATER EXPLOSIONS
VIBRATION ISOLATORS
DEVELOPMENT OF AUTOMATICALLY HARDENING SHOCK MOUNTS,
AD-438 143 DIV. 31

UNDERWATER ORDNANCE
EXPLOSIVE TRAINS
DEVELOPMENT OF PRECISION PRESSURE DETONATED DEEP SOUND SIGNALS,
AD-438 524 DIV. 22

OF CYCLOPROPANES,
AD-438 396 DIV. 4

STIFFENED CYLINDERS
MANUFACTURING METHODS
BIAXIAL HYDROSTATIC COMPRESSION TESTING OF STIFFENED AND UNSTIFFENED CYLINDERS: OPTIMUM FILAMENT DIAMETER,
AD-439 655 DIV. 26

STIFFENED CYLINDERS
SUBMARINE HULLS
HYDROSTATIC PRESSURE TESTS OF A RING-STIFFENED CYLINDER OF OVAL CROSS SECTION (MAJOR-TO-MINOR AXIS RATIO OF 1.5),
AD-439 208 DIV. 31

STORAGE
WOOD
WOOD FOR USE IN BULK STORAGE STRUCTURES,
AD-438 021 DIV. 14

STORAGE BATTERIES
ELECTRODES
LITHIUM-SILVER CHLORIDE SECONDARY BATTERY INVESTIGATION,
AD-439 399 DIV. 7

STRAIN GAGES
SOILS
DEVELOPMENT OF A SOIL STRAIN GAGE FOR LABORATORY DYNAMIC TESTS,
AD-438 826 DIV. 30

STRATOSPHERE
ATMOSPHERIC SOUNDING
SCALE OF STRATOSPHERIC DETAIL STRUCTURE,
AD-438 843 DIV. 2

STRESS (PHYSIOLOGY)
DENTISTRY
HEMATOLOGIC CHANGES FOLLOWING SIMPLE EXODONTIA,
AD-439 666 DIV. 16

STRESSES
CORROSION
STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS,
AD-437 965 DIV. 17

STRESSES
EQUATIONS
ELASTIC AND PLASTIC STRESS EQUATIONS FOR HOLLOW CYLINDERS AND SPHERES SUBJECTED TO INTERNAL AND EXTERNAL PRESSURE,
AD-439 614 DIV. 28

STRESSES
SOLIDS
CONSTITUTIVE EQUATIONS OF VISCOELASTIC SOLIDS UNDER FINITE DEFORMATION,
AD-439 685 DIV. 28

STRESSES
ULTRASONIC RADIATION
THE USE OF ULTRASONIC WAVES FOR STRESS DETERMINATIONS,
AD-438 449 DIV. 28

STRESSES
WAVE TRANSMISSION
A MACHINE PROGRAM FOR COMPUTING NONLINEAR VISCOELASTIC WAVE PROPAGATION IN SOILS,
AD-438 168 DIV. 2

STRUCTURAL SHELLS
BUCKLING (MECHANICS)
ON THE MECHANISM OF BUCKLING OF A CIRCULAR CYLINDRICAL SHELL UNDER LONGITUDINAL IMPACT,
AD-438 856 DIV. 12

STRUCTURAL SHELLS
RUPTURE
RUPTURE SURFACES OF THICK SPHERICAL SHELL UNDER INTERNAL PRESSURE,
AD-439 018 DIV. 28

STRUCTURES
CONCRETE
MONTE CARLO COMPUTATION OF 100,000 1 MEV GAMMA RAYS SCATTERED BY CONCRETE SLABS,
AD-438 908 DIV. 20

STRUCTURES
FATIGUE (MECHANICS)
INVESTIGATION OF EDDY CURRENT TECHNIQUES IN ANALYZING AIRCRAFT STRUCTURES FOR FATIGUE DAMAGE,
AD-438 893 DIV. 28

STRUCTURES
MATERIALS
INFORMATION REQUIREMENTS FOR APPLICATION OF NON-METALLIC STRUCTURAL MATERIALS TO AEROSPACE VEHICLES,
AD-439 427 DIV. 14

STRUCTURES
WOOD
WOOD FOR USE IN BULK STORAGE STRUCTURES,
AD-438 021 DIV. 14

STUDS
WOOD
SOME ASPECTS OF SAWING ACCURACY IN CIRCULAR MILLS,
AD-438 013 DIV. 26

SUBJECT INDEXING
ELECTRONICS
ECAC THESAURUS OF KEYWORDS,
AD-439 204 DIV. 32

SUBMARINE HULLS
HYDROSTATIC PRESSURE
EXPLORATORY INVESTIGATION OF NONWELDED PRESSURE HULLS FOR HYDROSPACE VEHICLES,
AD-439 588 DIV. 31

SUBMARINE HULLS
STIFFENED CYLINDERS
HYDROSTATIC PRESSURE TESTS OF A RING-STIFFENED CYLINDER OF OVAL CROSS SECTION (MAJOR-TO-MINOR AXIS RATIO OF 1.5),
AD-439 208 DIV. 31

SUPERCONDUCTIVITY
BIBLIOGRAPHIES
SUPERCONDUCTIVITY JANUARY-JUNE 1963: AN ANNOTATED BIBLIOGRAPHY,
AD-438 180 DIV. 25
SUPERCONDUCTIVITY, 1961-1962: AN ANNOTATED BIBLIOGRAPHY,
AD-438 181 DIV. 25

SUPERCONDUCTIVITY
THIN FILMS (STORAGE DEVICES)
SUPERCONDUCTIVE EFFECTS IN THIN FILMS,
AD-439 221 DIV. 25

SUPERSONIC FLOW
COMBUSTION
UNIDIMENSIONAL THEORY OF SUPERSONIC COMBUSTION,
AD-438 664 DIV. 10

SUPERVISORY PERSONNEL
AIR FORCE PERSONNEL
STUDIES OF AIR FORCE EXECUTIVES, IV. PRETESTING A TASK INVENTORY FOR EXECUTIVES (TIE) OF THE OCAMA,
AD-439 054 DIV. 23

SURGERY
AMPUTATION STUMPS
EXPERIMENTAL SURGERY ON RESUSCITATION AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG,
AD-439 024 DIV. 16

SURGERY
LEGS
EXPERIMENTAL SURGERY ON RESUSCITATI AND REUNION OF AMPUTATED OR NEARLY AMPUTATED LEG,
AD-439 022 DIV. 16

SWITCHING CIRCUITS
DISCHARGE TUBES
HIGH POWER MERCURY SWITCH,
AD-438 254 DIV. 8

SWITCHING CIRCUITS
SEQUENCES
SPEED INDEPENDENT NOR REALIZATIONS,
AD-439 439 DIV. 30

SYMPOSIA
EAR
NEURAL MECHANISMS FOR RESPONSES OF MIDDLE EAR MUSCLES,
AD-439 381 DIV. 16

SYNTHETIC RUBBER
POLYMERIZATION
SYNTHESIS AND POLYMERIZATION OF FLUORINATED SULFUR MODIFIED NITROSO RUBBER,
AD-437 996 DIV. 4

SYNTHETIC RUBBER
PRODUCTION
NITROSO RUBBER RESEARCH, DEVELOPMENT AND PRODUCTION,
AD-439 696 DIV. 14

SYNTHETIC RUBBER
SYNTHESIS (CHEMISTRY)
ARCTIC RUBBER,
AD-437 945 DIV. 4

S-MATRIX
ELASTIC SCATTERING
RELATIVISTIC PARTICLE DYNAMICS AND THE S-MATRIX,
AD-439 077 DIV. 25

TABLES
DIFFERENTIAL EQUATIONS
SOLUTIONS OF THE THOMAS-FERMI-DIRAC STATISTICAL MODEL OF ATOMS,
AD-438 434 DIV. 20

TANTALUM ALLOYS
PIPES
TANTALUM ALLOY TUBING DEVELOPMENT PROGRAM,
AD-438 777 DIV. 17

TARGET DRONES
AERIAL TARGETS
EVALUATION OF THE COMPATIBILITY OF THE AQM-37A TARGET AND LAU-24/A LAUNCHER WITH THE F-4B LAUNCH AIRCRAFT,
AD-439 518 DIV. 12

TEACHING MACHINES
MATHEMATICS
USE OF AUTOMATED INSTRUCTION IN REVIEW MATHEMATICS FOR THE BASIC SONARMAN COURSE (C-560),
AD-438 255 DIV. 30

TELEMETER SYSTEMS
BIBLIOGRAPHIES
PCM TELEMETRY: AN ANNOTATED BIBLIOGRAPHY,
AD-439 442 DIV. 5

TELEMETER SYSTEMS
DOCUMENTATION
TELEMETRY AND COMMAND DESTRUCT TECHNIQUES,
AD-439 200 DIV. 30

TELEMETER SYSTEMS
PROJECTILE FUZES
TELEMETRY PROGRAM FOR THE DEVELOPMENT OF A FUZE FOR THE XM474 PROJECTILE,
AD-439 335 DIV. 22

TELEVISION GUIDANCE
CAMERA TUBES
A COMPARATIVE SURVEY OF TYPES OF SPACE STABILIZATION FOR TELEVISION SYSTEMS,
AD-439 511 DIV. 12

TELLURIDES
SOLAR CELLS
RESEARCH ON THIN FILM POLYCRYSTALLINE SOLAR CELLS,
AD-438 526 DIV. 7

TENTS
ARMY EQUIPMENT
REFERENCE MANUAL ON TENTAGE,
AD-438 008 DIV. 29

TERMINAL FLIGHT FACILITIES
GLIDE PATH SYSTEMS
STUDY OF CAPTURE-EFFECT GLIDE-SLOPE MONITOR TECHNIQUES,
AD-438 166 DIV. 1

TERRAIN
ANALYSIS
ENVIRONMENT AND DISTRIBUTION OF THERMAL RELIEF FEATURES IN THE NORTHERN FOOTHILLS SECTION, ALASKA,
AD-438 135 DIV. 2

TERRAIN
STATISTICAL ANALYSIS
STATISTICAL STUDIES OF STABLE GROUND ROUGHNESS,
AD-438 405 DIV. 11

TERRAIN
SURFACE PROPERTIES
ADDITIONAL RESULTS ON THE STATISTICAL ANALYSIS OF A LINEAR VEHICLE USING MEASURED GROUND POWER SPECTRAL DENSITY,
AD-438 406 DIV. 11

TEST CONSTRUCTION (PSYCHOLOGY)
PSYCHOMETRICS
COMPARISON OF TEST ITEMS ACROSS FORMS,
AD-437 933 DIV. 28

TEST METHODS
GUIDED MISSILE COMPONENTS
WS-1338 MINUTEMAN GROUND ELECTRONICS SYSTEM FIGURE A 14125, RADIO SET AN/GRC-128. DETAILED TEST REQUIREMENTS FOR EVALUATION TEST PROGRAM,
AD-438 054 DIV. 12

TEST SETS
INTERFERENCE ANALYZERS
RADIO INTERFERENCE MEASURING SET AN/TRM-6(XA-3),
AD-437 907 DIV. 30

THALAMUS
VIRUS DISEASES
ANALYSIS OF THE DEVELOPMENT OF JAPANESE B ENCEPHALITIS VIRUS WITH THE ELECTRON MICROSCOPE,
AD-438 698 DIV. 14

THERMAL CONDUCTIVITY
BODY FLUIDS
THERMAL AND ELECTRICAL CONDUCTIVITIES OF BIOLOGICAL FLUIDS AND TISSUES,
AD-438 144 DIV. 16

THERMAL CONDUCTIVITY
COOLING + VENTILATING EQUIPMENT
EXPERIMENTAL STUDY OF CONTACT HEAT EXCHANGE,
AD-437 961 DIV. 13

THERMAL CONDUCTIVITY
PLANETS
RADIATIVE TRANSPORT OF HEAT IN LUNAR AND PLANETARY INTERIORS,
AD-439 434 DIV. 2

THERMAL INSULATION
AIRPLANE PANELS
'K' FACTOR DETERMINATION OF FOUR TYPES OF PANEL CONSTRUCTION IN F-111 AIRPLANE,
AD-438 470 DIV. 14

THERMAL INSULATION
MATERIALS
HEAT SHIELD CONCEPTS AND MATERIALS FOR REENTRY VEHICLES,
AD-439 449 DIV. 14

THERMAL INSULATION
STRUCTURAL PARTS
DEVELOPMENTS IN THERMAL-STRUCTURAL COMPOSITES AT GENERAL DYNAMICS/FORTH WORTH,
AD-438 471 DIV. 14

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

UNDERWATER SOUND
ARCTIC OCEAN
DIRECTIONAL, SPECTRAL, AND STATISTICAL PROPERTIES OF THE UNDER-ICE NOISE IN THE ARCTIC,
AD-439 916 DIV. 2

UPPER ATMOSPHERE
ABSTRACTS
PHENOMENA IN THE UPPER ATMOSPHERE, COMPILATION OF ABSTRACTS FROM SOVIET LITERATURE,
AD-439 227 DIV. 2

UPPER ATMOSPHERE
CLOUDS
FORBIDDEN REGIONS FOR THE FORMATION OF CLOUDS IN A PLANETARY ATMOSPHERE,
AD-438 216 DIV. 2

UPPER ATMOSPHERES
BIBLIOGRAPHIES
PHENOMENA IN THE UPPER ATMOSPHERE, COMPILATION OF ABSTRACTS FROM SOVIET LITERATURE,
AD-439 228 DIV. 2

URANIUM COMPOUNDS
CARBIDES
DISPERSED URANIUM MONOCARBIDE -URANIUM NUCLEAR FUEL MATERIAL,
AD-438 919 DIV. 17

VANADIUM ALLOYS
MECHANICAL PROPERTIES
VANADIUM ALLOY STUDIES,
AD-438 875 DIV. 17

VEHICLES
STABILITY
STATISTICAL STUDIES OF STABLE GROUND ROUGHNESS,
AD-438 405 DIV. 11
ADDITIONAL RESULTS ON THE STATISTICAL ANALYSIS OF A LINEAR VEHICLE USING MEASURED GROUND POWER SPECTRAL DENSITY,
AD-438 406 DIV. 11

VERTICAL TAKE-OFF PLANES
MATHEMATICAL MODELS
SIMULATION OF HELICOPTER AND V/STOL AIRCRAFT, VOLUME II, V/STOL ANALYSIS REPORT,
AD-438 926 DIV. 9

VERY LOW FREQUENCY
ELECTRIC FIELDS
ELECTRIC FIELDS FROM AIRBORNE VERTICAL AND HORIZONTAL DIPOLES AT VERY-LOW FREQUENCIES,
AD-439 649 DIV. 8

VIBRATION
ATTENUATION
DISTRIBUTION OF LOSSES IN LONGITUDINALLY EXCITED VIBRATORS,
AD-438 169 DIV. 25

VIBRATION
MOLECULES
THE EFFECTS OF ELECTRONIC EXCHANGE ON THE EFFICIENCY OF VIBRATIONAL EXCITATION BY MOLECULAR COLLISIONS,
AD-439 604 DIV. 25

VIBRATION
NUCLEAR POWERED VESSELS
CALCULATED NORMAL MODES AND NATURAL FREQUENCIES OF NS SAVANNAH, INCLUDING SPRUNG MASS CONSIDERATION OF THE CONTAINMENT VESSEL,
AD-439 207 DIV. 31

VIBRATION ISOLATORS
PHYSICAL PROPERTIES
DEVELOPMENT OF AUTOMATICALLY HARDENING SHOCK MOUNTS,
AD-438 143 DIV. 31

VIBRATORS (MECHANICAL)
ATTENUATION
DISTRIBUTION OF LOSSES IN LONGITUDINALLY EXCITED VIBRATORS,
AD-438 169 DIV. 25

VIRUS DISEASES
INFECTIOUS HEPATITIS
ELECTRON MICROSCOPE STUDY ON THE INFECTIOUS HEPATITIS,
AD-439 053 DIV. 16

VIRUSES
BIRDS
ON THE GROWTH MECHANISM OF PSITTACOSIS-TRACHOMA VIRUSES IN TISSUE CULTURE,
AD-439 273 DIV. 16

VIRUSES
TISSUE CULTURE
ON THE GROWTH MECHANISM OF PSITTACOSIS-TRACHOMA VIRUSES IN TISSUE CULTURE,
AD-438 665 DIV. 16
ON THE GROWTH MECHANISM OF PSITTACOSIS-TRACHOMA VIRUSES IN TISSUE CULTURE,
AD-438 666 DIV. 16
ON THE GROWTH MECHANISM OF PSITTACOSIS-TRACHOMA VIRUSES IN TISSUE CULTURE,
AD-438 667 DIV. 16

VISCOELASTICITY
EQUATIONS
CONSTITUTIVE EQUATIONS OF VISCOELASTIC SOLIDS UNDER FINITE DEFORMATION,
AD-439 685 DIV. 25

VISCOELASTICITY
THERMODYNAMICS
APPLICATION OF IRREVERSIBLE THERMODYNAMICS IN FINITE VISCOELASTIC DEFORMATIONS,
AD-438 003 DIV. 25

VISIBILITY
MALAYA
VISIBILITY CONDITIONS IN MALAYA,
AD-439 510 DIV. 2

VISUAL PERCEPTION
CEREBRAL CORTEX
STUDIES OF: (A) THE VISUAL FIELDS OF MONKEYS (B) MEMORY PROCESSES AS AFFECTED BY CEREBRAL LESIONS IN MONKEYS,
AD-438 389 DIV. 16

VOCABULARY
RADIO INTERFERENCE
ECAC THESAURUS OF KEYWORDS,
AD-439 204 DIV. 32

WAKE
HYPERSONIC CHARACTERISTICS
EXPERIMENTAL DETERMINATION OF PRESSURE, TEMPERATURE, AND DENSITY IN SOME LAMINAR HYPERSONIC NEAR WAKES,
AD-439 642 DIV. 9

WAKE
PROGRAMMING (COMPUTERS)
ANALYSIS OF WAKE SURVEY OF SHIP MODELS COMPUTER PROGRAM AML PROBLEM NO. 840-219F,
AD-438 855 DIV. 15

WARFARE
PROGRAMMING (COMPUTERS)
A PREVIEW OF MILITRAN, A SYSTEM FOR THE DEVELOPMENT OF COMPUTER PROGRAMS THAT SIMULATE MILITARY SITUATIONS,
AD-438 866 DIV. 18

WAVE FUNCTIONS
THEORY
EXPANSIONS OF SPHEROIDAL WAVE FUNCTIONS,
AD-439 011 DIV. 18

WAVE TRANSMISSION
INTEGRAL TRANSFORMS
REFLECTIONS IN AND FROM ONE-DIMENSIONAL REGULAR AND IMPERFECT POINT LATTICES,
AD-439 609 DIV. 25

WAVEGUIDES
MICROWAVES
MICROWAVE INVESTIGATION OF THE DIELECTRIC WAVEGUIDE PROPAGATION BY MAGNETO-IONIC DUCTS,
AD-439 213 DIV. 25

WAVEGUIDES
WAVE FUNCTIONS
REFLECTIONS IN AND FROM ONE-DIMENSIONAL REGULAR AND IMPERFECT POINT LATTICES,
AD-439 609 DIV. 25

WEATHER FORECASTING
STATISTICAL ANALYSIS
STATISTICAL-DYNAMICAL METEOROLOGICAL PREDICTIONS,
AD-437 950 DIV. 2
WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM,
AD-439 415 DIV. 2

WELDING
PIPES
APPLIED RESEARCH AND DEVELOPMENT WORK ON FAMILIES OF BRAZED AND WELDED FITTINGS FOR ROCKET PROPULSION FLUID SYSTEMS,
AD-438 225 DIV. 27

WELDING
THERMITE
THERMIT WELDING: A SELECTIVE BIBLIOGRAPHY,
AD-439 446 DIV. 26

WELDS
FRACTURE (MECHANICS)
CRACKING IN HIGH-STRENGTH STEEL WELDMENTS --A CRITICAL REVIEW,
AD-438 432 DIV. 26

WHISKERS
CRYSTAL GROWTH
THE KINETICS OF DIFFUSION CONTROLLED WHISKER GROWTH,
AD-439 497 DIV. 25

WIND
SPECIAL PURPOSE COMPUTERS
METEOROLOGICAL DATA REPORT AEROBEE KP 3.3,
AD-439 680 DIV. 12

WIND TUNNEL MODELS
TEST METHODS
DAMPING IN SLIGHTLY NON-LINEAR SYSTEMS: IMPLICATIONS TO DYNAMIC STABILITY TESTING,
AD-438 655 DIV. 9

WIND TUNNEL NOZZLES
ELECTRIC ARCS
SOME CONSIDERATIONS IN THE DESIGN OF WATERCOOLED NOZZLE THROAT SECTIONS FOR HIGH TEMPERATURE, HIGH PRESSURE OPERATION,
AD-437 973 DIV. 9

WINGS
MANUFACTURING METHODS
LAMINAR FLOW CONTROL DEMONSTRATION PROGRAM, LFC MANUFACTURING TECHNIQUES,
AD-439 329 DIV. 26

WIRE
BERYLLIUM
EVALUATION OF FINE, ANODIZED BERYLLIUM WIRE,
AD-439 085 DIV. 17

WIRE
MATERIAL FORMING
DEVELOPMENT OF VERY HIGH STRENGTH BERYLLIUM WIRE,
AD-439 498 DIV. 26

WIRE
STRAIN (MECHANICS)
SITTING TIME AND STRAIN EFFECTS IN A .00008 INCH DIAMETER COLD WIRE FOR LOW DENSITY SHOCK TUBE USE,
AD-438 450 DIV. 9

WOOD
PRESERVATION
COMPARISON OF WOOD PRESERVATIVES IN STAKE TESTS,
AD-437 932 DIV. 14

WOOD
PROTECTIVE COVERINGS
OVERLAYS FOR LUMBER--AN OLD PRODUCT IN A NEW DRESS,
AD-438 020 DIV. 14

WOOD
STRUCTURAL PROPERTIES
WOOD FOR USE IN BULK STORAGE STRUCTURES,
AD-438 021 DIV. 14

X-RAY CAMERAS
FLUORESCENCE
AN X-RAY FLUORESCENCE CAMERA,
AD-438 037 DIV. 24

X-RAY SPECTROSCOPY
X-RAY CAMERAS
AN X-RAY FLUORESCENCE CAMERA,
AD-438 037 DIV. 24

X-RAY TUBES
COLD CATHODE TUBES
DEVELOPMENT OF HIGH PERFORMANCE COLD CATHODE FLASH X-RAY TUBES,
AD-439 094 DIV. 8

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

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Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM ABSTRACTS. Volume 4, no. 3, 1 Apr 64, 22p
Contract AT(45-1)1350
OTS $0.50

AGRICULTURE

OTS SB-530
Office of Technical Services, Dept. of Commerce, Washington, D. C.
AGRICULTURE, FOOD, FISHES, FORESTRY. PART I: PL-480 TRANSLATION PROGRAM. Feb 64, 18p
OTS Selective Bibliography SB-530
OTS $0.10

DESCRIPTORS: *Bibliographies, *Agriculture, *Food, *Fishes, *Forestry

Lists 301 translations financed with currencies accrued in Israel, Poland and Yugoslavia as a result of sale abroad of American surplus agricultural commodities. Material selected by scientists of U.S. agencies participating in this program. Subjects are arranged in the following categories: Animal Husbandry; Fishes, Food; Forestry; Pest Control; Plant Cultivation; Soils; Agriculture General. Most of these translations are available through OTS for about a penny a page.

ASTRONOMY

Astrophysics

N64-18432
Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
COSMIC GAMMA RAY RESULTS FROM EXPLORER XI
W. L. Kraushaar, G. W. Clark, M. Agagino, G. Garmire, and H. Helmken. [1963] 8p
Grant NsG-386
NASA CR-53590
OTS $1.10

DESCRIPTORS: *Cosmic rays, *Gamma rays,

N64-18433
Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
COSMIC RAY EQUILIBRIUM
W. L. Kraushaar. [1964] 4p
Grant NsG-386
NASA CR-53589
OTS $1.10

DESCRIPTORS: *Cosmic rays, Energy,

N64-18431
Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
X-RAY PRODUCTION IN SUPER NOVA REMNANTS
G. W. Clark and M. Oda. [1963] 7p
Grant NsG-386; Contract AT(30-1)2098
NASA-CR-53591
OTS $1.10

DESCRIPTORS: *X rays, *Supernovae,

N64-18439
Research Labs. for the Engineering Sciences, Univ. of Virginia, Charlottesville.
EVALUATION OF THE LUNAR PHOTOMETRIC FUNCTION. Final rept.
Hermon M. Parker, Thomas T. Mayo, IV, D. Scott Birney, Jr., and George McCloskey. Jan 64, 71p
Grant NsG-468
Rept. no. AST-4015-101-64U; NASA CR-53576
OTS $7.60

DESCRIPTORS: *Moon, Surface properties, *Photometers.

BEHAVIORAL SCIENCES

Human Engineering

PB-165 957
School of Aerospace Medicine, Brooks AFB, Tex.
DISORIENTATION: AN EVALUATION OF THE ETIOLOGIC FACTORS
Ralph N. Kraus. 7 May 59, 10p
Rept. no. 59-90; AD-231 542
OTS $1.10

DESCRIPTORS: *Space perception, *Proprioception, *Visual perception, *Instrument flight, Flight paths, Vertigo, Vestibular apparatus, Etiology, Pilots,

A brief history of the development of instrument flight is presented, and the physiological mechanisms involved in maintaining aerial orientation are reviewed. Each of three subjects flying in F-100F aircraft completed transition from VFR (Visual flight-rules) to IFR (Instrument flight rules) in an average time of 24, 27, and 26.5 seconds, respectively. No abnormal changes in the attitude of the aircraft or in the flight path took place during the transition. An aircraft flying at 10,000 feet can assume an attitude from which recovery is impossible in as little time as 20 seconds if the pilot does not have a visual reference. The period of time that the pilot deliberates -from the instant when he loses his outside visual reference until he initiates transition to IFR - is the critical factor in disorientation accidents. A jet aircraft can assume an attitude from which recovery is impossible while the pilot is completely unaware that a change in attitude has occurred. (Author)

were tried for the purpose of establishing graduated degrees of familiarity among different sets of forms. Three variations of the sorting technique yielded approximately the same upper limit of familiarity as measured by Subjects' ratings. A different procedure which required the Subject to draw the outline of the form during a brief exposure produced higher maximum ratings. Testing for actual recognition performance under noise has not been completed. (Author)

PB-165 875
Institute for [Psychological Research], Tufts Univ., Medford, Mass.
THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS. Final rept.
Mason N. Crook, Harold P. Bishop, John Coules, Florence E. Gray, and John A. Hanson. 31 Jan 59, 17p
Contract DA49-007-MD-536
AD-218 902
OTS $1.60

DESCRIPTORS: *Visual perception, Images, *Display systems, Noise, Facsimile equipment, *Psychometrics,

Research under the contract, as detailed in interim and progress reports, is reviewed and summarized. Data were reported on the effect of visual noise on the perception of familiar and unfamiliar forms against plain and complex backgrounds in a prototype electro-visual system. Recognition-noise functions tended to be sigmoid, but to vary with the type of form and other conditions. Characteristics of forms having significance for recognizability did not lend themselves to simple geometrical specification. Subjects' response tendencies, of a type determined in part by the experimental context and not readily controllable, proved to be a significant factor in performance. Various characteristice of the display system, the forms, the backgrounds, and the experimental context interacted to produce complex data for which tentative interpretations are presented. (Author) (See also PB-165 874)

AD-420 948
School of Aerospace Medicine, Brooks AFB, Tex.
PSYCHIATRIC ASPECTS OF THE SAM TWO-MAN SPACE CABIN SIMULATOR
Earl H. Cramer. Sep 63, 19p
SAM-TDR-63-27; N63-23338
OTS $1.60

DESCRIPTORS: *Social psychology, *Space crews, *Spacecraft cabins, Flight simulators, Group dynamics, Stress (Psychology), Emotions, Space flight,

Psychiatric studies were made of crew interactions on a series of eight Two-Man Space Cabin Simulator experiments. Crew interaction was observed periodically over closed-circuit television and surveillance microphones. Other information was obtained from diaries and debriefings. Many situations and factors, which have been forecast in the literature as having potential psychiatric significance, did not appear to be problems on these simulated flights. Some factors, however, such as work-rest schedules, boredom, and interpersonal relations, do appear as areas of potential concern on actual prolonged space flight. (Author)

AD-423 397
British Columbia Research Council, Vancouver (Canada).
MOSQUITO REPULSION. Annual progress rept., 1 Feb-31 Oct 63
R. H. Wright [1963] 56p
Contract DA49-193-MD-2391
OTS $1.50

DESCRIPTORS: *Culicidae, *Aedes, *Anopheles, *Insect repellents, Sensory mechanisms

Based on experiments with Aedes aegypti, a theory of the repellent action of chemicals like dimethyl phthalate was advanced. The responses of Anopheles quadrimaculatus were sufficiently different from those of Aedes aegypti to suggest that this theory is probably an over-simplification. Nevertheless, the presumption remains that the insect does not react to the presence of dimethyl phthalate specifically, but rather that the chemical repellents act on a sensory system that normally serves for the perception of some other environmental factor(s). (Author)

BNL-805
Brookhaven National Lab., Upton, N. Y.
MERISTEMS AND DIFFERENTIATION. REPORT OF SYMPOSIUM HELD JUNE 3-5, 1963. Brookhaven Symposia in Biology no. 16. Mar 64, 256p
C-38
OTS $2.50

PB-165 887
Georgia Inst. of Tech., Atlanta.
MITOTIC INHIBITION INDUCED IN GRASSHOPPER NEUROBLASTS BY EXPOSURE TO OZONE
Robert H. Fetner. Jun 63, 13p
Contract AF41(657)263
SAM-TDR-63-39; N63-22981
OTS $1.60

DESCRIPTORS: *Mitosis, Inhibition, *Nerve cells, Cell division, Orthoptera, *Ozone, Genetics,

Living neuroblasts of the grasshopper Chortophaga viridifaciata were exposed to ozone. The threshold dose necessary to produce a significant delay in mitosis was determined. Inhibition was reversible and mitosis, though delayed, went to completion. Cells dosed before early prophase were inhibited and differed from the controls in the time taken to reach anaphase. Cells in more advanced stages proceeded to anaphase at a time not significantly different from the controls. Cells exposed in anaphase, telophase, interphase, and very early prophase were delayed in passing through midprophase and late prophase stages. Progression through preceeding and succeeding stages was the same as control preparations. Exposure to ozone in the preprophase stages resulted in inhibition in late prophase, and cells exposed in later stages proceeded through the next cell division uninhibited. Stages sensitive to the threshold concentration of ozone are preprophase, and the inhibited stages are middle and late prophase. (Author)

AD-422 291
School of Aerospace Medicine, Brooks AFB, Tex.
SPATIAL DISORIENTATION-CURRENT CONCEPTS AND AEROMEDICAL IMPLICATIONS
Robert H. Bonner. Aug 63, 28p
Review 7-63; N63-23658
OTS $2.60

DESCRIPTORS: *Aviation medicine, *Space perception, *Psychophysiology, *Position finding, Pilots, Training, Aviation accidents, Flight instruments.

A critical review with 56 references.

Personnel and Training

NASA-TN-D-2255
Bolt, Beranek and Newman, Inc., Cambridge, Mass.
THE ADAPTIVE DYNAMIC RESPONSE CHARACTERISTICS OF THE HUMAN OPERATOR IN SIMPLE MANUAL CONTROL
Laurence R. Young, David M. Green, Jerome I. Elkind, and Jennifer A. Kelly. Apr 64, 104p
Contract NASw-185
N64-18734
OTS $2.50

DESCRIPTORS: *Tracking, Control, *Human engineering.

PB-165 332
Minneapolis-Honeywell Regulator Co., Minn.
STUDIES COMPARING EFFECTIVENESS OF THREE-DIMENSIONAL VERSUS TWO-DIMENSIONAL PRESENTATIONS. Final rept.
H. E. Guttmann and D. A. Anderson. 6 Nov 62, 66p
Contract AF30(602)2379
MH MPG rept. 1525-TR-1; RADC TDR 63-39
OTS $6.60

DESCRIPTORS: *Display systems, *Stereoscopic display systems, Effectiveness, Tests, Personnel, Visual acuity, Space perception, Position finding,

This study compared the efficacy of two types of displays: A real three-dimensional display versus an orthogonal dual projection two-dimensional display. Subjects were required to make judgments of absolute position of targets, relative position of targets, absolute velocity, and relative velocity. In judgments of absolute velocity, performance was slightly superior on the three-dimensional display. In the other areas investigated, performance was superior on the two-dimensional display. (Author)

AD-423 657
School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECT OF ANCILLARY PERSONNEL ON THE TREATMENT CAPABILITY OF A USAF DENTAL OFFICER
Walter V. Davis, Richard E. McKenzie, and Warren R. Hester. Oct 63, 8p
SAM-TDR-63-35
OTS $1.10

DESCRIPTORS: *Dental personnel, *Officer personnel, *Air Force personnel, *Dentistry,

Restorative dentists treat only 33% of the total carious lesions among Air Force personnel. In other words, two-thirds of all lesions remain untreated. To maintain a military force capable of sustained service, not hindered or incapacitated by dental therapy requirements, the treatment capability of the restorative dentist must be improved. Several studies were made to increase treatment efficiency. The help of a dental assistant increased the efficiency of treatments 68%. The results were obtained by use of standard operating procedures, equipment, treatment, and instruments. The operatory was according to a recent definitive design of the Department of Defense for an Air Force restorative dentistry operatory. (Author)

AD-280 420
School of Aerospace Medicine, Brooks AFB, Tex.
NOISE EXPOSURE OF B-52 AND KC-135 AIRCRAFT MAINTENANCE PERSONNEL
Lennart L. Kopra and Lee E. Strickland (Univ. of Texas). 28 Jun 61, 19p
Rept. no. 61-117
OTS $1.60

DESCRIPTORS: *Noise, *Maintenance personnel, *Air Force personnel, Aircraft, *Airplane engine noise.

In view of the intermittency of the noise exposure and the relatively short duration of continuous-exposure periods experienced by aircraft engine and maintenance personnel, and in light of the current hearing-damage-risk criteria, the present interpretation of the noise-exposure-time results is that B-52 and KC-135 maintenance personnel, with very few exceptions, are not exposed to potentially hazardous levels long enough to experience irreversible hearing loss provided that available ear protection devices are worn consistently by these men. (Author)

Psychology

PB-165 874
Institute for [Psychological Research], Tufts Univ., Medford, Mass.
THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTRO-VISUAL DISPLAY SYSTEMS.
Progress rept. no. 5, 1 Nov 56-31 Jan 58
Mason N. Crook. 31 Jan 58, 12p
Contract DA49-007-MD-536
AD-155 153
OTS $1.60

DESCRIPTORS: *Visual perception, Images, *Display systems, Noise, Facsimile equipment, *Psychometrics,

This report describes briefly five experiments, the results of which are still under analysis. The first experiment was designed to throw light on the relative importance of reduced contrast and degradation of contour for the impairment of form recognition under visual noise. Landolt rings were used as test copy. When contour degradation was eliminated, scores deteriorated gradually with decreasing contrast. When contour degradation was added scores deteriorated much more rapidly. The remaining experiments were part of an unfinished series concerned with the effect of the degree of familiarization on recognition of irregular forms under noise. Card-sorting techniques

Habituation of nystagmus elicited by repetitive caloric stimulation was studied in seven decorticated cats. The histopathologic studies revealed total ablation of neocortex, excepting small remnants in two cases, and extensive damage to basal ganglia and diencephalon. All animals exhibited response decline of nystagmus, demonstrating that neocortex and probably basal ganglia and diencephalon are not essential for inducing habituation. There was no conclusive data regarding transfer and long-lasting retention of the response decline. The locus and neurophysiologic basis of the phenomenon are discussed. (Author)

AD-423 385
Massachusetts Inst. of Tech., Cambridge.
EFFECT OF STRESS ON NUTRIENT REQUIREMENTS OF MAN. Progress rept., 1 Nov 62-31 Oct 63
Nevin S. Scrimshaw [1963] 108p
Contract DA49-193-MD-2239
OTS $2.50

DESCRIPTORS: *Nutrition, *Stress (Psychology), *Psychophysiology, Students, Stress (Physiology), Diet, Excretion, Metabolism

The major experimental projects involved three studies upon the physiological effect of the reversal of night and day and two studies on the effect of examinations. Subjects were evaluated psychiatrically in all trials in two of the reversal studies and one of the examination studies psychiatric interviews were performed in addition to the physiological and biochemical measurements. Two studies during the January and Spring vacations involving two groups of five students showed that when such individuals were subjected to a reversal of night and day accompanied by an obligation to work during such reversed periods there was enhanced excretion of nitrogen, inorganic sulfate sulfur and during the reversal periods these were paralleled by the excretion of 17-hydroxysteroids; very little effect was observed on the excretion of creatinine, sodium and potassium. Two studies upon the physiological effect upon the stress of examinations were also completed. Both studies showed essentially the same response, a greatly enhanced variability in the day by day excretion of nitrogen and inorganic sulfate sulfur paralleled by the excretion of 17-hydroxycorticosteroids during the examination as compared to the baseline. (Author) (See also AD-288 149)

PB-165 959
School of Aerospace Medicine, Brooks AFB, Tex.
AN APPARATUS FOR THE SPIRAL AFTEREFFECT TEST (SAET)
Richard E. McKenzie and Bryce O. Hartman. 22 Apr 60, 6p
Rept. no. 60-69; AD-247 014
OTS $1.10

DESCRIPTORS: Space medicine, Medical equipment, Simulation, Diagnostic agents, *Cerebral cortex, *Wounds and injuries, Acceleration, *Acceleration tolerance.

Considerable evidence exists to support the efficacy of the Spiral Aftereffect Test (SAET) as a clinical tool in assessing cortical brain damage. The technic of using this test has not been standardized. This paper describes an apparatus for the SAET which permits an evaluation of many of the variables in the technic of administering the test. With this device it will be possible to develop standardized experimental technics which maximize and minimize the spiral after-image and demonstrate the relative value of the SAET as a clinical diagnostic tool. (Author)

PB-165 928
School of Aerospace Medicine, Brooks AFB, Tex.
BLOOD ORGANIC PHOSPHATE IN HYPERTHERMIC DOGS
G. S. Kanter (Albany Medical College) Jun 59, 8p
Rept. no. 59-36
OTS $1.10

DESCRIPTORS: *Blood chemistry, *Phosphates, *Organic phosphorus compounds, *Fevers, Dogs, Exercise.

Sixteen experiments were conducted on 8 unanesthetized dogs. In a group of 8 dogs exposed to 120° F., the whole blood inorganic P fell from a control value of 3.2 to 0.7 mg. percent at the end of 4 hours in a hot room, while the whole blood organic P increased from a control value of 23.1 to 27.2 mg. percent at the end of 4 hours' exposure to heat. Six control dogs exposed to 76° F. air temperature for 4 hours showed no significant changes in whole blood inorganic or organic P. The increase in metabolism which is responsible for the inorganic-organic shift is mainly due to vigorous panting; dogs tested at 105° F., requiring mild panting, showed no fall in inorganic P nor increase in organic P. In 1 anesthetized dog all skeletal muscle activity was inhibited by curarization. Upon exposure to heat no fall in inorganic P or increase in organic P occurred. The fall in inorganic P is, therefore, directly related to the large increase in metabolism which occurs as a result of the exercise involved in panting. (Author)

PB-165 947
School of Aerospace Medicine, Brooks AFB, Tex.
BLOOD VOLUME IN RATS EXPOSED TO POTENTIAL SPACE CABIN ATMOSPHERES. HEMATOLOGIC RESPONSES TO PURE OXYGEN ATMOSPHERES AT 190mm. Hg TOTAL PRESSURE
Mary E. Bates and Jack H. Bates. 17 Mar 60, 15p
Rept. no. 60-64; AD-244 205
OTS $1.60

DESCRIPTORS: *Blood volume, *Oxygen, *Rats, *Hematology, Barometric pressure, Controlled atmospheres, Tolerances (Physiology), Spacecraft cabins.

Three groups of rats showed tolerance to an experimental environment of approximately 100 per cent oxygen at 190 mm. Hg total atmospheric pressure for 168, 120, and 96 hours, respectively, with no significant visible effects. The animals exhibited tolerance to an experimental atmosphere consisting of negligible amounts of nitrogen. No significant change was found in the hematologic determinations performed. The findings lend support to the hypothesis that no significant physiologic changes will result from prolonged exposure to such an atmosphere. (Author)

OTS SB-531
Office of Technical Services, Dept. of Commerce, Washington, D. C.
BIOLOGICAL SCIENCES. PART II: PL-480 TRANSLATION PROGRAM. Feb 64, 12p
OTS Selective Bibliography SB-531
OTS $0.10

DESCRIPTORS: *Bibliographies, *Biology

Lists 188 translations financed with currencies accrued in Israel, Poland and Yugoslavia as a result of sale abroad of American surplus agricultural commodities. Material selected by scientists of U.S. agencies participating in this program. Subjects are arranged in the following categories: Biochemistry; Botany; Microbiology; Neurology and Psychiatry; Pathology; Physiology; Radiobiology; Zoology; Biological Sciences, General. Most of these translations are available from OTS for about a penny a page.

AD-420 947
School of Aerospace Medicine, Brooks AFB, Tex.
A MODIFIED LABORATORY TECHNIC FOR PREPARING CHROMOSOMES FROM HUMAN AND ANIMAL PERIPHERAL BLOOD LEUKOCYTES
John W. Foft and Petra A. Romero. Sep 63, 9p
SAM-TDR-63-44; N63-23780
OTS $1.10

DESCRIPTORS: *Chromosomes, *Leukocytes, Blood, Cells (Biology), Genetics,

A method for obtaining chromosome spreads from human and animal blood is presented in detail. It is based on previously described methods which have been modified to improve the chances of successful culture and to provide a more flexible system for clinical and experimental purposes. (Author)

AD-280 433
School of Aerospace Medicine, Brooks AFB, Tex.
QUANTITATIVE ANALYSES BY DIFFUSION COLUMN REACTIONS. VARIATIONS IN DIFFUSION MEASUREMENTS IN AGAR COLUMNS. REPRODUCIBILITY OF ANALYSES PERTINENT TO THE DETERMINATION OF REACTANT CONCENTRATIONS IN AGAR COLUMNS. ANTIGEN AND ANTISERUM CONCENTRATION DIFFERENCES FROM DIFFUSION MEASUREMENTS OF SIMPLE HOMOLOGOUS REACTIONS IN AGAR COLUMNS. OBSERVATIONS ON THE EFFECTS OF STORAGE, TEMPERATURE, AND SEVERAL OTHER FACTORS ON SIMPLE DIFFUSION (OUDIN) COLUMNS.
William G. Glenn. 10 Jul 61, 36p
Rept. nos. 62-(1-4)
OTS $3.60

DESCRIPTORS: *Antigens and antibodies, *Immune serums, *Culture media, Blood serum, Diffusion, Quantitative analysis, Chemical reactions, Storage, Temperature.

AD-279 506
School of Aerospace Medicine, Brooks AFB, Tex.
STRESS IN DENTAL PATIENTS. THE SERUM FREE 17-HYDROXYCORTICOSTEROID RESPONSE IN ROUTINELY APPOINTED PATIENTS UNDERGOING SIMPLE EXODONTIA
Ira L. Shannon, Gerald M. Isbell, John R. Prigmore, and Warren R. Hester. 11 Sep 61, 6p
Rept. no. 62-27
OTS $1.10

DESCRIPTORS: *Dentistry, *Corticosteroid agents, *Stress (Physiology), Excision, Teeth, Blood serum,

Preoperative and postoperative serum free 17-hydroxycorticosteroid determinations were carried out on 233 systemically healthy young male adults undergoing a simple exodontic procedure. The anticipation of dental treatment produced a significant increase in preoperative steroid levels. Even though the subjects presented in a state of adrenocortical hyperactivity, the exodontic procedure produced a significant additional rise in steroid concentrations. The postoperative course of cortical readjustment was virtually linear during the two-hour experimental period. Additional studies indicated that the subsequent onset of postoperative pain due to anesthesia loss produced a secondary cortical stimulation. Body fluid 17-hydroxycorticosteroid measurements offer a completely objective approach to reaction studies in dental patients. (Author)

Anatomy and Physiology

AD-425 564
Chicago Univ., Ill.
FROG LABYRINTHINE EFFERENT IMPULSES
R. S. Schmidt. 14 May 63, 15p
SAM-TDR-63-66; N64-13869
OTS $1.60

DESCRIPTORS: Ear, *Semicircular canals, *Nerve impulses, Auditory nerve, *Proprioception, Sensory mechanisms, Otorhinolaryngology, Stimulation, Amphibians.

Efferent impulses were recorded from the free ends of nerves detached from the ampullae, sacculus, utriculus, and lagena in the leopard frog (Rana pipiens). These impulses were found to be initiated by stimulation of any ampulla or a variety of unidentified extralabyrinthine proprioceptors. None were evoked in response to stimulation of the auditory or otolith organs. There was no spontaneous resting activity in the efferent fibers. Surgical difficulties have so far prevented adequate study of possible efferent input to the pars basilaris and pars neglecta. (Author)

AD-421 144
Chicago Univ., Ill.
STUDIES ON HABITUATION OF VESTIBULAR REFLEXES. EFFECT OF CALORIC STIMULATION IN DECORTICATED CATS
Cesar Fernandez and R. S. Schmidt. 6 May 63, 23p
Contract AF41(609)1479
SAM-TDR-63-61; N63-23811
OTS $2.60

DESCRIPTORS: *Reflexes, *Vestibular apparatus, *Stimulation, *Heat, Eye, Ear, Nystagmus, Nerve impulses, Neuromuscular transmission, Ganglia, Cerebrum, Cats, Cerebral cortex, Motor reactions.

lack but was unaffected by excess calcium. Maximum depolarization rate increased about 20 percent during calcium deprivation and fell a similar amount during high calcium perfusion. The membrane potential at the moment of maximum depolarization rate was unchanged from normal by either experimental solution. High calcium augmented the "spike" and "plateau" during repolarization, while calcium deficiency abolished the "spike," producing "hump-backed" action potentials with prolonged membrane reversal. These results are discussed, in relation to possible changes in permeability during upstroke of the action potential. (Author)

AD-422 509
School of Aerospace Medicine, Brooks AFB, Tex.
EXCLUSION OF ANGULAR ACCELERATIONS AS THE PRINCIPAL CAUSE OF VISUAL ILLUSIONS DURING PARABOLIC FLIGHT MANEUVERS
Bruce H. Warren, James A. Roman, and Ashton Graybiel. 16 Jul 63, 13p
SAM-TDR-63-78; BuMed Proj. MR005.13-6001, rept. no. 85
N64-12677
OTS $1.60

DESCRIPTORS: *Visual perception, *Afterimages, *Acceleration, Weightlessness, Gravity, Flight paths,

The angular accelerations produced in the pitch axis during parabolic flights in the F-100F jet aircraft were reversed 180° with reference to the experimental subject. This was accomplished by flying the aircraft upside down during most of the subgravity period. During such reversal of angular accelerations, no difference was noted in the observed apparent displacements of a visual real target and afterimage from those observed when the aircraft was flown right side up. The conclusion is drawn that the angular accelerations resulting in the above maneuvers are not a significant factor in producing visual illusions previously observed and described during the subgravity phase. (Author)

PB-165 952
School of Aerospace Medicine, Brooks AFB, Tex.
EXPERIMENTAL OBSERVATIONS IN POSTURAL NYSTAGMUS. EXTENSIVE LESIONS IN POSTERIOR VERMIS OF THE CEREBELLUM
George Allen and Cesar Fernandez (Univ. of Chicago)
2 Mar 59, 14p
Rept. no. 59-74; AD-226 822
OTS $1.60

DESCRIPTORS: Nystagmus, *Positioning reactions, Excision, *Cerebellum, Reflexes, *Vestibular apparatus, Proprioception, Sensory mechanisms, Neuromuscular transmission,

Ablation of the posterior vermis of the cerebellum was performed in the cat. Histologic controls showed that the lesion included the pyramis, uvula, and nodulus, but tuber vermis and nuclei fastigii may be encroached upon. The result was a syndrome characterized by disequilibrium and postural nystagmus during the unstabilized period of cerebellar deficiency, followed by compensation. The postural nystagmus was a "benign paroxysmal type," which was consistently vertical toward the nose and which appeared mainly when the animal was in a supine position. It was fatigable after several repeated tests and disappeared within a few days or weeks. It could not be reproduced in bilateral labyrinthectomized animals. These experiments support the concept that the paleocerebellum plays an important role in the regulation of vestibular reflexes. Some lesions of this area seemed to release the vestibular centers from cerebellar inhibition. It was postulated that this loss of inhibition, together with the existence of incoming signals from the peripheral receptors, carrying the information of position change of the head, were the primary conditions that elicited the postural nystagmus in these animals. The neural mechanism of the disturbance is still obscure. (Author)

PB-165 900
School of Aerospace Medicine, Brooks AFB, Tex.
INFLUENCE OF BODY WEIGHT AND GROWTH RATE ON FASTING-INDUCED CHANGES IN NITROGEN AND ELECTROLYTE EXCRETION IN RATS
Roy B. Mefferd, Jr. (Baylor Univ.) and Henry B. Hale.
19 Jul 60, 6p
Rept. no. 61-10; AD-250 049
OTS $1.10

DESCRIPTORS: N-heterocyclic compounds, Ketones, *Starvation, *Nitorgen, *Calcium, *Phosphates, *Urea, *Sodium, *Potassium, *Magnesium, *Uric acid, *Metabolism, Body weight, Growth (Physiology), Excretion, *Electrolytes (Physiology), Rats

Young male rats that differed only about 20 percent in body weight had significant ($P \leq .05$) metabolic differences during a 3-day fast. These included calcium, ph phosphate, urea, creatinine, the Na/K, Mg/Ca, Ca/PO_4, and uric acid/creatinine ratios. There was an almost tenfold difference in their respective growth rates, however, which undoubtedly contributed to the differences. These differences tended to disappear in almost all variables as the fast progressed. The various ratios proved to be very sensitive to the group differences. (Author)

PB-165 902
School of Aerospace Medicine, Brooks AFB, Tex.
AN IN VIVO METHOD TO MEASURE RELATIVE BLOOD VISCOSITY AND FACTORS ASSOCIATED WITH HINDRANCE
Robert M. Olson. Feb 63, 13p
SAM-TDR-62-128; N63-16508
OTS $1.60

DESCRIPTORS: *Blood circulation, Inhibition, *Medical equipment, Viscosity, Pressure gages, Hematocrit, Blood pressure, *Blood vessels, Measurement,

A method to measure blood viscosity and the factors associated with hindrance by an in vivo method are described. A vascular bed was connected to a pressure generator and recording system by fluid connections. At rest the vascular bed was perfused by the animal itself, but during the two or three seconds of an experimental run, the perfusion pressure was supplied solely by the pressure generator. The apparatus was so constructed that the flow rate was proportional to the rate of change of pressure. The shape of the curve of pressure versus time was determined solely by total resistance in the vascular bed. When conditions were set up so that vessel configuration was held constant, changes in total resistance were due solely to changes in viscosity. Blood viscosity as a function of hematocrit was determined by this method. The study of factors associated with hindrance, such as elastic

PB-165 929
School of Aerospace Medicine, Brooks AFB, Tex.
THE CAUSE OF HYPOGLYCEMIA IN DOGS EXPOSED TO HEAT
G. S. Kanter (Albany Medical Coll.) 13 Oct 58, 14p
Rept. no. 59-38
OTS $1.60

DESCRIPTORS: *Dogs, *Hypoglycemia, *Glucose, Blood, *Respiration, Heat, Exercise.

When unanesthetized dogs are exposed to heat, hypoglycemia results. One would expect that the dehydration which also occurs should cause an increase in blood glucose concentration, as is usually found in man. The tendency is present in dogs, but the utilization of glucose is sufficiently rapid to offset the hemoconcentration and cause a fall in glucose levels even when exogenous glucose (11 percent) is given by stomach tube at the rate of 1 percent body wt. /hr. This increased utilization was demonstrated to be due mainly to involvement of the respiratory muscles used in the panting mechanism, since blood glucose does not fall under similar conditions when the animal is curarized. The evidence shows that the hypoglycemic mechanism present in dogs is not a species phenomenon but is probably also present in man under appropriate conditions. In both man and the dog, the occurrence of hypoglycemia depends on the degree of involvement of the respiratory apparatus. (Author)

AD-403 116
School of Aerospace Medicine, Brooks AFB, Tex.
THE DETECTION OF IN-FLIGHT HYPERVENTILATION BY BLOOD AND URINE ANALYSES
James P. Ellis, Jr. and J. Gordon Wells. 9 Jul 62, 10p
SAM-TDR-62-117; N63-13538
OTS $1.10

DESCRIPTORS: *Aircraft cabins, *Blood, *Urine, Analysis, pH, Aviation medicine, Pilots, *Respiration, Controlled atmospheres, Carbon dioxide

An alternate method for the detection of in-flight hyperventilation in pilots was investigated. The method is based on the measurement of several acid-base related components in blood and urine, and is more convenient and practical than the previously described method based on the measurement of PA_{CO_2} in end-expired air samples collected during flight. The data indicated that when a relatively small degree of hyperventilation is experienced by pilots, as indicated by the in-flight PA_{CO_2}, the corresponding small change in blood and urine components is insignificant. When the in-flight PA_{CO_2} indicates a greater degree of hyperventilation, however, blood and urinary variables are significantly changed. It is concluded that the method can detect hyperventilation at a level of concern. (Author)

PB-165 892
School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECT OF DECREASED BAROMETRIC PRESSURE ON MAXIMUM PRESSURE-VOLUME RALATIONSHIPS OF THE HUMAN RESPIRATORY SYSTEM
Louis F. Johnson, Jr. 7 May 63, 13p
SAM-TDR-63-62
OTS $1.60

DESCRIPTORS: *Respiratory system, *Respiration, *Barometric pressure, Volume, Humans, High altitude.

Maximum expiratory and inspiratory pressures and the resulting lung-volume changes were simultaneously recorded at ground level (approximately 747 mm. Hg) and at 30,000-feet-pressure altitude (225 mm.Hg). For given pulmonary pressures, lung-volume changes were greater at 30,000 feet than at ground level. The area of the maximum pressure-volume diagram at 30,000 feet was 79% of the area of the same diagram at ground level. (Author)

AD-426 008
School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF VENTILATING AIR FLOW ON HUMAN WATER REQUIREMENTS
B. E. Welch, R. G. Cutler, J. E. Herlocher, J. J. Hargreaves, and F. Ulvedal. 3 May 63, 14p
SAM-TDR-63-59; N64-12855
OTS $1.60

DESCRIPTORS: *Pressure suits, *Ventilation, Gas flow, *Heat transfer, *Water, *Space medicine, Life support, Temperature, High altitude.

The paper presents the results of a preliminary experiment designed to study water requirements of men wearing partially donned and fully donned pressure suits. The 13-day test was conducted at an altitude of 27,000 feet in an atmosphere of essentially 100% oxygen. The pressure suits were similar to standard pressure garments except the arms and legs were detachable at the middle of the upper arm and leg. Ventilating air flow was provided by means of on-board, high-speed centrifugal compressors. Water requirements were determined by measuring water intake and output, as well as following urine osmolarity, specific gravity, blood hematocrit, and urea nitrogen. Water requirements were found to increase over previously noted values at this altitude. This increase was reflected by a slight decrease in urine volume and by an increase in water lost through the lungs and skin. The pressure suits were well tolerated by the test subjects and posed no particular problem. The effects of the suits on the men and on heat exchange pathways were discussed. (Author)

PB-165 901
School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF CALCIUM DEFICIENCY AND EXCESS ON TRANSMEMBRANE POTENTIALS IN FROG HEART
Frederick Ware. Aug 62, 16p
SAM-TDR-62-100
OTS $1.60

DESCRIPTORS: *Heart, *Permeability, Tissues (Biology), Membranes (Biology), Amphibians, *Calcium, Blood disorders, Voltage,

The effects of severe calcium deficiency and calcium excess upon transmembrane potentials in isolated frog ventricular strips are investigated. Resting potential rose about 5 mv. above normal during perfurion with 3-times-normal calcium and fell about 4 mv. below normal during exposure to calcium-free Clark's solution. Mean overshoot rose about 3 mv. during calcium

PB-165 956
School of Aerospace Medicine, Brooks AFB, Tex.
A PRELIMINARY STUDY OF THE EFFICIENCY OF LIMITED FREQUENCY MONITORING AUDIOMETRY IN THE AIR FORCE HEARING CONSERVATION PROGRAM
Daryle L. Waldron. 6 May 59, 6p
Rept. no. 59-89; AD-228 807
OTS $1.10

DESCRIPTORS: *Audiometry, Aviation medicine, *Thresholds (Physiology), Noise, Tolerances (Physiology), *Hearing, Auditory acuity, Auditory perception

The Rudmose audiograms of 879 aircraft and engine maintenance men were examined in such a way as to answer two questions: (1) The poorest threshold level of hearing would have been identified in what percentage of this sample if tested only at 4000 cps? (2) What percentage of those with a 15 db or higher hearing level, at any of the frequencies from 500 cps through 4000 cps, would have been picked up for more extensive testing if they had been screened at 15 db for 4000 cps only? Approximately 35 percent were found to have recorded their poorest threshold level at 4000 cps. Of those with a 15 db or higher hearing level at some frequency (or frequencies) below 4000 cps, 97.7 percent would have been identified by 4000 cps screening at 15 db above audiometric zero. (Author)

PB-165 933
School of Aerospace Medicine, Brooks AFB, Tex.
RECOVERY OF VISUAL DISCRIMINATION AFTER HIGH INTENSITY FLASHES OF LIGHT
Sanford L. Severin. 25 Jul 61, 12p
Rept. no. 62-16
OTS $1.60

DESCRIPTORS: Space medicine, *Adaptation (Physiology), *Eye, Retina, *Vision, Sensory mechanisms, Tolerances (Physiology), *Light, Laboratory equipment.

The Meyer-Schwickerath Zeiss light coagulator was used in a study designed to determine whether it can be used effectively as a research tool to investigate the phenomenon of flash blindness and to determine whether the functional visual loss following dazzle is a phenomenon that can be accurately measured. The experiment confirmed the effectiveness and reliability of the use of the light coagulator. The results also indicated that recovery from dazzle is consistent and repetitive within acceptable units for biologic experimentation. (Author)

AD-280 423
School of Aerospace Medicine, Brooks AFB, Tex.
THE RELIABILITY AND EQUIVALENCY OF THE CID W-22 AUDITORY TESTS
Dorothy Huntington and Mark Ross (Stanford Univ. School of Medicine) 12 Jun 61, 8p
Rept. no. 61-110
OTS $1.10

DESCRIPTORS: *Auditory acuity, *Hearing, *Medical examination, Reliability, Speech,

The purpose of the study was to evaluate the reliability and equivalency of the CID W-22 Auditory Tests for a group of subjects with sensorineural hearing losses. Lists 1, 2, 3, and 4 were administered and readministered to 33 adults. Statistically significant mean differences were obtained between lists 1 and 3, 1 and 4, and 2 and 4. The reliability coefficients of all of the lists were higher than .90. The intercorrelations of all the lists were also fairly high, except that list 3 tended to depress any correlation in which it appeared. The magnitude of the differences among the lists is probably not great enough to be considered clinically, but it should be taken into account in research efforts. (Author)

PB-165 948
School of Aerospace Medicine, Brooks AFB, Tex.
A SEARCH FOR DIURNAL CHARACTERISTICS IN HUMAN WHOLE STIMULATED SALIVA
Ira L. Shannon and John R. Prigmore. 19 Nov 58, 12p
Rept. no. 59-46; AD-228 802
OTS $1.60

DESCRIPTORS: Diurnal variations, *Saliva, *Secretion, Stimulation, Humans, Chemical analysis, Electrolytes (Physiology),

Stimulated whole saliva was collected at two-hour intervals from 5:00 a.m. through 9:00 p.m. on three different days from the same 29 healthy male subjects. Volume, certain electrolytes, and correlation coefficients were determined. Day-to-day reproducibility for the groups was excellent. Significant differences were found in the time means for volume, sodium, potassium, and chloride. Significant day-by-time interaction demonstrated that subjects did not respond similarly in time on each of the three days. No definitely predictable diurnal pattern was found. No specific conclusions could be drawn regarding the relationship of volume and the salivary constituents under study in this experiment. (Author)

PB-165 891
School of Aerospace Medicine, Brooks AFB, Tex.
STEROID AND CATECHOLAMINE STUDIES ON PILOTS DURING PROLONGED EXPERIMENTS IN A SPACE CABIN SIMULATOR
Frode Ulvedal, Woodward R. Smith, and Billy E. Welch. 18 Apr 63, 16p
SAM-TDR-63-53; N63-22667
OTS $1.60

DESCRIPTORS: Space medicine, Excretion, *Urine, *Space flight, Simulation, Hormones, *Corticosteroid agents, *Pyrocatechol, Stress (Physiology),

Urinary excretion of 17-OHCS, corticosterone-like hormones, and catecholamines was investigated in pilots during prolonged experiments in a two-man space cabin simulator. The experimental profiles were: (1) two 17-day experiments at ground level; (2) two 14-day experiments at 27,000 feet; and (3) four 17-day experiments at 33,500 feet. In the latter two groups, the atmosphere was essentially 100% O_2. The hormone parameters indicate that conditions imposed by the experimental procedures were no more stressful to the subjects than undergoing extensive medical examinations, as observed from pre-experimental and post-experimental values. The only significant trend was the continuous linear increase in the excretion of corticosterone-like hormones. Extraordinary occurrences in the simulator were correlated with in-

coefficients of vessel walls, geometry of vascular bed, and critical closure phenomenon depends on the ability to measure instantaneous values of vascular resistance under conditions of varying perfusion pressure. (Author)

PB-165 927
School of Aerospace Medicine, Brooks AFB, Tex.
MAINTENANCE OF ACCLIMATIZATION BY RE-EXPOSURE TO ALTITUDE
John L. Chapin (Colorado Univ. Medical Center)
26 Aug 58, 14p
Rept. no. 59-23
OTS $1.60

DESCRIPTORS: Space medicine, Environmental tests, *Acclimatization, Exposure, *Adaptation (Physiology), Hypoxia, *High altitude, Oxygen consumption,

Four groups of subjects were acclimatized to high altitude for 2 1/2 to 3 weeks. Thereafter each group was re-exposed to this altitude periodically. Tests were performed to determine how well the initial acclimatization was maintained by the various kinds of re-exposure. The group which best retained acclimatization was re-exposed 12 hours out of each 48 hours to the higher of the two altitudes used (4,350 meters) and was physically conditioned. This group retained acclimatization better than a comparable group which was reexposed twice as long (24 hours out of each 48 hours) to a lower altitude (3,250 meters). (Author)

PB-165 930
School of Aerospace Medicine, Brooks AFB, Tex.
PAROTID GLAND SECRETION RATE AS A METHOD FOR MEASURING RESPONSE TO GUSTATORY AND MASTICATORY STIMULI IN HUMANS
Ira L. Shannon and Howard H. Chauncey (Tufts Univ.)
28 Jan 59, 9p
Rept. no. 59-66
OTS $1.10

DESCRIPTORS: *Salivary glands, Secretion, Saliva, Sensory mechanisms, *Taste, Stimulation, *Mastication, Reflexes, Neuromuscular transmission, Humans,

Parotid gland secretion rate was employed as a means of measuring gustatory and masticatory response in humans. Glandular secretion rate was observed to be a linear function of the logarithm of bolus volume (masticatory stimuli) and application rate (gustatory stimuli). Parotid flow rate was only slightly affected by chewing rate. Increasing concentrations of gustatory stimuli resulted in a secretory response which was linear throughout the entire series for sucrose and quinine, but was linear only at lower concentrations with citric acid and sodium chloride. Mathematical expression of the relationship between glandular secretion rate, bolus volume, and application rate permitted calculation of maximal response and reflex equilibrium constants for the various stimuli. The results indicated that at least three gustosalivary reflex pathways are involved. (Author)

PB-165 893
School of Aerospace Medicine, Brooks AFB, Tex.
PHOTOSTRESS AND FLASH BLINDNESS IN AEROSPACE OPERATIONS
Sanford L. Severin, Albert V. Alder, Norris L. Newton, and James F. Culver. 15 May 63, 11p
SAM-TDR-63-67
OTS $1.60

DESCRIPTORS: *Flashblindness, Space medicine, Space flight, Eye, *Vision, Retina, Cornea, *Mydriatics, Drugs, Inhibition,

The hazard of flash blindness to the success of an aerospace mission is well recognized. This paper presents the results of several experiments designed to study the severity of the visual disturbance from this type of photostress. In these expanded and more comprehensive studies subjects have been exposed to bright flashes that illuminate the cornea with intensities up to 242,000 lux (about twice the illumination that an unprotected astronaut would be exposed to on an earth orbit). An analysis has been made of the effect of drug-induced miosis upon the time required for recovery. The relevance of the information derived from this work to problems of space and nuclear operations is mentioned, and the operational significance is implied. (Author)

PB-165 924
School of Aerospace Medicine, Brooks AFB, Tex.
PLASMA AND TISSUE ELECTROLYTE CHANGES PRODUCED IN DOGS BY HYPERCAPNIA, HYPOCAPNIA, AND HYPOXIA
Clyde Biddulph, H. Hof, Richard Clancy, and E. B. Brown, Jr. (Univ. of Minnesota) 23 May 60, 8p Rept. no. 60-83; AD-250 044
OTS $1.10

DESCRIPTORS: Aviation medicine, *Blood plasma, Tissues (Biology), *Electrolytes (Physiology), *Hypoxia, Muscles, Dogs, Respiration, Oxygen, Carbon dioxide, Diagnostic agents.

Sodium, chloride, and potassium concentrations were determined on heart, liver, and skeletal muscle of dogs subjected to one of four procedures: 1 hour of controlled breathing at normal rate (controls), 1 hour of breathing 30 percent CO_2 (hypercapnia), 1 hour of hyperventilation (hypocapnia), or 1 hour of breathing 8 percent O_2 (hypoxia). In addition to Na, Cl, and K, bicarbonate was determined on skeletal muscle. Plasma values for these electrolytes and pH were determined. The usual picture of respiratory acidosis from breathing a high CO_2 mixture; respiratory alkalosis from hyperventilation; and mild respiratory alkalosis from hypoxia are apparent in the blood data. The only tissue electrolyte change sufficiently large and consistent to be potentially useful as a postmortem test for an abnormal premortem condition was the change in bicarbonate content of skeletal muscle. The usefulness of this test is limited, by the fact that the concentration of bicarbonate in tissue changes with the time the tissue is exposed to air. (Author)

AD-287 082
Indiana Univ., Indianapolis. [School of Medicine]
AN IMPROVED METHOD FOR PHOTOGRAPHIC MEASUREMENT OF RETINAL VENOUS BLOOD OXYGEN
John B. Hickam and Joseph C. Ross. 18 Jan 62, 9p
Contract AF41(657)225
SAM-TDR-62-64
OTS-1.10

DESCRIPTORS: *Blood chemistry, *Oxygen, *Retina, Ophthalmology, Photographic analysis

Modifications of a previously reported photographic method (PB-143745 and PB-153 303) are described for estimating percent oxygen saturation of retinal venous blood in man. The method is based on the use of differential filters in determining the percent of oxyhemoglobin, using different filter technics from those used in previous studies. In the described method, the relative intensities of light from the optic disc and from the retinal vessels are estimated from the density of images which they produce on photographic film under controlled conditions. With the proper logarithmic formulas, use is made of the fact that the percent oxygen saturation of blood bears a linear relationship to its optical density at a wavelength where reduced and oxygenated hemoglobin have different absorption coefficients (640 m_{μ} used in this case). The actual value of a given optical ratio in terms of percent blood oxygen saturation was determined from a regression line based on experimental results utilizing various oxygen-nitrogen percentages and performing conventional brachial arterial blood oxygen saturation determinations while photographing the eye. The method described embodies several modifications from previous studies including a beam splitter, the use of interference filters instead of Wratten filters, and the use of precisely described film exposure and development technics. By use of these methods and this technic, the formulas are given for arriving at definite values for the relative optical densities. (Author)

PB-165 888
Minnesota Univ., Minneapolis.
THORACIC CAGE IMPEDANCE MEASUREMENTS. CALIBRATION OF AN IMPEDANCE PNEUMOGRAPH
William Kubicek, Edwin Kinnen, and Andrew Edin.
14 Mar 63, 11p
Contract AF41(657)403
SAM-TDR-63-41; N63-22666
OTS $1.60

DESCRIPTORS: *Medical equipment, *Respiration, Measurement, Electrical impedance, Thorax, Meters, Calibration,

An experimental calibration of an electrical impedance pneumograph is presented over a range of tidal volumes from 250 to 4,000 cc. Transthoracic impedance measurements were made on four subjects, by use of 1-inch cup electrodes and at a frequency of 100 kc. A 1-ohm change of impedance magnitude corresponding to an average tidal volume of 830 cc. was observed on the basis of 1,063 measurements. The standard deviation of these data was approximately 50% for low tidal volumes and 30% for the larger tidal volumes. Data from individual subject trials indicated significant variations in the calibration constants and regions of apparent linearity, both between subjects and between trials on each subject. (Author)

AD-423 077
Minnesota Univ., Minneapolis.
THORACIC CAGE IMPEDANCE MEASUREMENTS. IMPEDANCE PRODUCT SYSTEM
Edwin Kinnen and William Kubicek. 29 May 63, 14p
Contract AF41(657)403
SAM-TDR-63-69
OTS $1.60

DESCRIPTORS: *Cardiography, *Electrical impedance, Medical equipment, Circuits, Computers, Heart, Thorax

PB-165 937
School of Aerospace Medicine, Brooks AFB, Tex.
AN AIRCREW HYPOXIA-WARNING SYSTEM
James R. Neville. Mar 62, 10p
Rept. no. 62-55
OTS $1.10

DESCRIPTORS: *Hypoxia, *Oxygen masks, Oxygen, Pressure, Aviation personnel.

An aircrew hypoxia-warning system is described in detail. In-flight data obtained with this system during evaluation procedures carried out in an F-100 type research aircraft are presented. The warning system and the evaluation data are discussed in terms of some of the important operational features and requirements. The device is shown to give satisfactory warning of any situation tending to lower mask oxygen pressure below a given preset critical level. (Author)

PB-165 909
School of Aerospace Medicine, Brooks AFB, Tex.
A CLINICAL INVESTIGATION OF THE RELATIONSHIP OF MERCURY TO THE AMALGAM RESTORATION
Ralph W. Phillips (Univ. of Indiana) 9 Aug 60, 18p
Rept. no. 61-17; AD-253 005
OTS $1.60

DESCRIPTORS: *Dentistry, *Mercury alloys, Mercury, Surface properties, Fracture (Mechanics), Corrosion

Three different technics were used to place 257 amalgam restorations in standardized cavity preparations. They produced amalgam restorations which differed widely in mercury content and in physical properties. These restorations were examined 24 hours after insertion and, thereafter, at 3-month intervals over a 1-year period. No failures due to flow were observed, even in those instances in which the mercury content was approximately 62 percent. During the 1-year observation period only one case of isthmus fracture was observed, even though many of the restorations were purposely left in high occlusal relationship and one-third of them had a 24-hour compressive strength of only 13,000 p. s. i. Some marginal deterioration was noted in restorations placed by each technic; however, there was a very definite increase in both the number and the severity of marginal failures as the residual mercury content of the restorations increased. Surface roughness and general degradation were manifested by many restorations which contained 58 percent mercury, and there was further increase in both the number of incidences and the degree of degradation in the group of restorations containing 62 percent mercury. No correlation was observed between the amount of mercury in the final restoration and the degree or rate of tarnish and corrosion. (Author)

creased catecholamine and steroid excretion. The correlation coefficients and the analyses of variance for the four hormone parameters are calculated and discussed. (Author)

PB-165 926
School of Aerospace Medicine, Brooks AFB, Tex.
A VENTILATORY EFFECT OF CARBONIC ANHYDRASE INHIBITION IN MAN
Stephen M. Cain. 20 Jun 60, 8p
Rept. no. 60-93; AD-250 046
OTS $1.10

DESCRIPTORS: *Carbonic anhydrase, *Respiration, *Oxygen consumption, Inhibition, Carbon dioxide, Hypoxia, Humans, Males,

Five normal males were given 25 mg/kg. of the carbonic anhydrase inhibitor acetazolamide both orally and intravenously in separate experiments. The oral dose caused a significant increase in the ratio of ventilation to CO_2 output but only after a delay of approximately two hours after ingestion. The intravenous dose caused a greater increase in the ratio of ventilation to CO_2 output, as was evident as soon as the infusion of the drug was completed. It was concluded that carbonic anhydrase inhibition in man did produce a ventilatory effect which had not been demonstrated previously when the inhibitor was given orally. (Author)

Biochemistry

AD-425 940

Boeing Co., Seattle, Wash.
HESTIANIC ACID-A BIOLOGICALLY RESISTANT PIGMENT FROM AEROBIC WASTE DIGESTERS
Carl Emanuel. Oct 63, 15p
SAM-TDR-63-57; N64-13852
OTS $1.60

DESCRIPTORS: *Organic pigments, Disposal, *Wastes (Sanitary engineering), Decomposition, Chemical properties, Copper, Space biology.

The isolation and chemical properties of a brown, copper-containing pigment which arises from aerobic, biologic degradation of human waste are described. This pigment, herein called "hestianic acid," was shown to possess a formidable structural complexity and heterogeneity. It was also notable for its chemical and biologic inertness and, therefore, represented the main bulk of the residual organic material in the well-digested, activated sludge-process effluent. The present evidence indicates, but does not prove, that hestianic acid derives from the ubiquitous melanine pigments in natural foodstuffs. The pigment also possesses several properties in common with the humic acids and would, under less artificial conditions, be incorporated into the humic acids of the soil. (Author)

UCRL-11046
Lawrence Radiation Lab., Univ. of California, Berkeley.
BIO-ORGANIC CHEMISTRY QUARTERLY REPORT, JUNE-AUGUST 1963. 2 Oct 63, 240p
Contract W7405-eng-48
OTS $3.00

AD-287 093
School of Aerospace Medicine, Brooks AFB, Tex.
DENTAL CARIES AND SYSTEMIC STATUS. PAROTID FLUID FLOW RATE, PAROTID FLUID, AND SERUM INORGANIC PHOSPHATE AS RELATED TO DENTAL CARIES EXPERIENCE IN MAN
Ira L. Shannon, Gerald M. Isbell, William A. Gibson, and Timothy J. O'Leary. 26 Feb 62, 10p
SAM-TDR-62-71
OTS $1.10

DESCRIPTORS: *Teeth, Diseases, *Phosphorus, Phosphates, Diet, Saliva, Fluid flow, Blood serum.

Inorganic phosphate determinations were carried out on blood serum and parotid fluid obtained at a very low rate of flow from the 514 healthy, young adult males classified as to dental caries status (DMFS). No significant differences were found in the flow rate or the serum inorganic phosphate concentration of the six DMFS groups. Parotid fluid-inorganic phosphate concentration showed a significant inverse relationship ($P < .01$) to the status of dental caries, the mean falling progressively from approximately 33.0 mg. percent to about 26.0 mg. percent as DMFS rates rose from 0-10 to 50 or more. (Author)

Medical Specialties and Equipment

PB-165 886
Engineering Research Labs., Univ. of Arizona, Tucson.
DEVELOPMENT OF TELEMETRY DEVICES FOR DENTAL RESEARCH
Howard A. Baldwin. 7 Mar 63, 28p
Contract AF41(657)375
SAM-TDR-63-36; N63-22980
OTS $2.60

DESCRIPTORS: Telemetering systems, *Dentistry, Teeth, Medical equipment, Telemetering transmitters, Medical research,

Small radio transmitting devices and a receiving-recording system have been developed for the study of physiologic variables of interest to dental research. Frequencies above 100 megacycles are suitable radio carrier frequencies for transmission through biologic material, and considerable advantage exists at these frequencies over low-frequency transmitters owing to the small physical sizes of inductive and capacitive tuned circuit elements. Various construction technics and circuit designs have been explored, as have methods of fabrication of tooth-sized FM/FM telemetry transmitters. A receiver-recorder system has been designed for the recording of such discontinuous or random events as total tooth contacts in a 24-hour period. (Author)

AD-279 090
School of Aerospace Medicine, Brooks AFB, Tex.
AN ABSORBENT DISC METHOD FOR THE IDENTIFICATION AND TITRATION OF CYTOPATHIC VIRUSES AND THE DETECTION OF ANTIBODIES RESULTING FROM THEIR INFECTION
S. S. Kalter. 1 Aug 61, 10p
Rept. no. 62-20
OTS $1.10

DESCRIPTORS: *Poliomyelitis virus, *Viruses, *Antigens and antibodies, Infections, Volumetric analysis, Identification, Tissue culture, Cells (Biology), Immune serums,

Certain cytopathic viruses were identified and titrated, and neutralizing antibodies detected by means of a simple technic using absorbent discs. Filter paper, cut into small discs and then sterilized, was used to place virus or antiserum on the agar surface of a bottle or petri dish containing a monolayer of MKC. The resulting CPE, or its inhibition, is observed macroscopically. Antiserum-soaked discs were preserved by drying or lyophilization for relatively long periods. When antibody surveys are being made in the field, the use of discs may be found to be more valuable than venipunctures for collecting blood samples. The practical applications of these procedures are discussed. (Author)

PB-165 913
School of Aerospace Medicine, Brooks AFB, Tex.
CROSS-RESISTANCE AND FILAMENT REVERSAL STUDIES OF A HEXACHLOROPHENE-RESISTANT MUTANT OF ESCHERICHIA COLI B/R
James E. Moyer and Orville Wyss (Univ. of Texas)
24 Aug 60, 6p
Rept. no. 61-26; AD-250 050
OTS $1.10

DESCRIPTORS: *Tolerances (Physiology), Drugs, *Mutations, *Escherichia coli, Antibiotics, Adaptation (Physiology), *Chemotherapeutic agents

A hexachlorophene-resistant mutant of Escherichia coli B/r was studied to determine whether resistance to hexachlorophene conferred any reciprocal cross-resistance to other disinfectants structurally related. Because the mutant has consistently produced filamentous cells after repeated subculture, additional studies were undertaken to find some means whereby filamentation could be reversed. A possible explanation of the divisional anomaly is presented. (Author)

PB-165 914
School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF CHEMICAL AND PHYSICAL AGENTS ON A HEXACHLOROPHENE-RESISTANT MUTANT OF ESCHERICHIA COLI B/R
James E. Moyer and Orville Wyss (Univ. of Texas)
25 Aug 60, 7p
Rept. no. 61-27; AD-250 051
OTS $1.10

DESCRIPTORS: Tolerances (Physiology), Drugs, *Mutations, *Escherichia coli, Antibiotics, *Chemotherapeutic agents, Sensitivity, X rays, Ultraviolet radiation

The effects of various deleterious chemical and physical stimuli on a filamentous mutant of Escherichia coli B/r resistant to hexachlorophene were studied. The mutant was found to be more susceptible than the parent to all agents tested, including antibiotics, inorganic salts, ultraviolet, and x-radiation. The effect of the agents on the mutant is believed to be due to the aggravation of a pre-existent divisional abnormality. (Author)

AD-422 688
School of Aerospace Medicine, Brooks AFB, Tex.
ENZYME ACTIVITY ANALYSIS AS A METHOD FOR THE EVALUATION OF THE ACTION OF ORAL PREPARATIONS
Howard H. Chauncey and Ira L. Shannon. Sep 63, 17p
SAM-TDR-63-54
OTS $1.60

DESCRIPTORS: *Toilet articles, *Mouth, Teeth, *Enzymes, *Bacteria, Metabolism, *Chemotherapeutic agents, Saliva, Culture media, *Antimetabolites, Dentistry,

In an effort to develop a reproducible, objective method of studying natural and induced variation in the oral flora and their metabolic processes, enzyme analysis studies were carried out on whole saliva, dental plaque, and broth cultures of oral organisms. Various formulations of gum were used to evaluate the applicability of the technic. The data thus obtained indicate that if proper control procedures and standardized conditions are employed, alterations in the oral flora may well be detected by analysis of enzyme activity. (Author)

PB-165 912
School of Aerospace Medicine, Brooks AFB, Tex.
ISOLATION AND CHARACTERIZATION OF A FILAMENTOUS MUTANT OF ESCHERICHIA COLI B/R RESISTANT TO HEXACHLOROPHENE
James E. Moyer and Orville Wyss (Univ. of Texas)
16 Aug 60, 11p
Rept. no. 51-22; AD-250 988
OTS $1.60

DESCRIPTORS: Identification, Morphology (Biology), *Tolerances (Physiology), Drugs, *Escherichia coli, Antibiotics, *Chemotherapeutic agents, *Mutations

By means of continued cultivation in the presence of hexachlorophene, a mutant resistant to this agent has been obtained from Escherichia coli B/r. The mutant is unusual in that a proportionate number of cells from any culture have persisted in the filamentous state after more than 200 transfers in the absence of the stimulating agent. On the basis of standard identification tests and bacteriophage lytic patterns, the mutant is identical to the parent E. coli B/r strain. The mechanism by which bacteria may form filaments is discussed. (Author)

PB-165 880
School of Aerospace Medicine, Brooks AFB, Tex.
MICROBIOLOGIC STUDIES ON ECOLOGIC CONSIDERATIONS OF THE MARTIAN ENVIRONMENT
Irving Davis and John D. Fulton. Oct 59, 11p
Review 2-60; AD-235 895
OTS $1.60

DESCRIPTORS: *Space biology, *Microorganisms, *Mars, *Bacteria, *Ecology, Growth (Physiology), Adaptation (Physiology), Space medicine, Containers,

AD-422 773
School of Aerospace Medicine, Brooks AFB, Tex.
CONTINUOUS FUNCTIONAL TESTING OF OXYGEN BREATHING EQUIPMENT
J. Ryan Neville. Aug 63, 13p
SAM-TDR-63-56; N64-12176
OTS $1.60

DESCRIPTORS: *Oxygen equipment, *Oxygen masks, *Breathing apparatus, Test equipment, Hypoxia, Aviation personnel

A method is described for the continuous functional testing of aviator's oxygen breathing equipment. By use of an oxygen detector that fits in the mask, recordings were made of changes in oxygen partial pressure in going from automix to 100% oxygen. The results obtained were compared with the expected change, and conclusions were drawn concerning the fit and functioning of the oxygen mask. The detector was also used to monitor the oxygen concentration delivered by the regulator and comparisons were made of several different types of oxygen regulators. This comparison showed a consistent difference between the A-14A and the D-2A oxygen regulators. The difference was such as to permit a longer oxygen duration with the A-14A as compared with the D-2A when used with an oxygen system which was otherwise the same. The results are discussed in terms of certain operational features of interest to both military and civilian flying personnel. (Author)

PB-165 908
School of Aerospace Medicine, Brooks AFB, Tex.
A LOW-VOLUME OXYGENATOR FOR REGIONAL PERFUSION
William G. Malette, John B. Fitzgerald, and Ewald Koegel. 1 Aug 60, 6p
Rept. no. 61-16; AD-250 987
OTS $1.10

DESCRIPTORS: *Oxygen equipment, *Medical equipment, Mechanical organs, Gas flow, Volume

With the increasing use of regional isolation and perfusion technics, a simple, inexpensive low-volume blood oxygenator is a valuable asset to any hospital or surgical laboratory. An oxygenator of this type is described. It provides flow rates up to 300 cc. per minute and adequate oxygenation with an oxygen flow of 4 to 5 liters per minute. (Author)

AD-279 504
School of Aerospace Medicine, Brooks AFB, Tex.
MINIATURE AIR-BEARING-SUPPORTED, AIR-TURBINE-DRIVEN DENTAL HANDPIECE
G. L. Green, A. Bosco, E. S. Cain and E. L. Kumm.
8 May 61, 13p
Rept. no. 61-90
OTS $1.60

DESCRIPTORS: *Medical equipment, *Dentistry, *Gas bearings, Gas turbines.

The main objective of the program was to design, fabricate, and operate an air-bearing-supported, air-turbine-driven dental handpiece that would have a cutting capacity and a speed range compatible with the latest state of the art for commercial air-turbine dental handpieces. A design was conceived, test parts were fabricated, and tests were run to check the operating characteristics of the test parts. With the aid of the test data, the prototype handpiece was designed, fabricated, and successfully operated. Experimental data indicated that the prototype handpiece fulfilled all the functional requirements. (Author)

AD-425 542
School of Aerospace Medicine, Brooks AFB, Tex.
A RESTRAINT APPARATUS FOR THORACIC ROENTGENOGRAPHIC EXAMINATION OF UNANESTHETIZED PRIMATES
Robert J. Young. 7 Aug 63, 8p
SAM-TDR-63-93; N64-12865
OTS $1.10

DESCRIPTORS: *Medical equipment, *Primates, *Radiography, *X-ray photography, Mycobacterium tuberculosis,

An apparatus to immobilize a small primate during chest radiography is described. The use of this apparatus with proper exposure factors will produce radiographs of sufficient clarity to permit the detection of pulmonary tuberculosis. (Author)

PB-165 916
School of Aerospace Medicine, Brooks AFB, Tex.
VISUAL FLUORESCENT DETECTION BOX
Charles E. Craft. 8 Sep 60, 4p
Rept. no. 51-30; AD-254 865
OTS $1.10

DESCRIPTORS: *Containers, *Ultraviolet radiation, *Florescence, Visual inspection, Safety

The increasing importance of various aspects of ultraviolet action in the production of fluorescence has required the development of a new device for the detection of fluorescence. This device was designed for the detection and demonstration of fluorescent compounds without exposing the viewer to direct rays of ultraviolet light. (Author)

AD-424 120
School of Aerospace Medicine, Brooks AFB, Tex.
A WATER RECYCLING SYSTEM FOR USE IN SEALED ENVIRONMENTS
John Hargreaves, Thomas E. Morgan, Jr., and B. E. Welch. Oct 63, 8p
SAM-TDR-63-60; N64-12246
OTS $1.10

DESCRIPTORS: *Closed ecological systems, *Life support, Water, Urine, *Simulators, *Spacecraft cabins, Distillation, Vacuum apparatus,

Production of potable water by a vacuum distillation process that was used during several experiments in a two-man space cabin simulator is discussed. Wash water, condensate collected from the relative humidity control coils, and urine were collected by simulator crew occupants and processed through a vacuum distillation apparatus on board the simulator, to supply drinking water for crew members during experiments lasting 17 days and 30 days. (Author)

AD-423 696
Public Health Service. [Washington, D. C.] Div. of Health Mobilization
MEDICAL CARE IN SHELTERS. A REFERENCE MANUAL FOR ALLIED HEALTH WORKERS AND SELECTED, TRAINED LAYMEN. Dec 63, 151p
Contract OCD-OS-62-100
OTS $3.00

DESCRIPTORS: *Public health, Medicine, Therapy, Civil defense systems, *Civil defense personnel, *Shelters, *Diseases, *Wounds and injuries, Artificial respiration, Drugs, Medical supplies, Infants, *Instruction manuals,

The manual is intended as a quick reference guide for allied health workers and selected, trained laymen charged with the responsibility of administering shelter medical care in the absence of a physician. Its purpose is to aid them to quickly determine the treatment, under the austere limitations of the shelter, based on common symptoms. Recommended treatment is primarily for symptoms rather than the uncertainties of inexperienced diagnosis. (Author)

AD-425 541
School of Aerospace Medicine, Brooks AFB, Tex.
ASCORBIC ACID LEVELS IN BLOOD AND URINE AS RELATED TO ORAL HEALTH STATUS
Ira L. Shannon and William A. Gibson. 17 Jul 63, 14p
SAM-TDR-63-79
OTS $1.60

DESCRIPTORS: *Teeth, *Mouth, Diseases, *Ascorbic acid, Public health, Blood chemistry, Urine, Parenteral infusions, Dentistry,

Whole blood ascorbic acid determinations were carried out on 341 apparently healthy young adult males, both before and after the intravenous administration of 500 mg. of ascorbic acid. Four-hour urine recovery rates of this added ascorbic acid were also calculated. Ascorbic acid levels in these fluids were not significantly related to caries experience. Periodontal status could not be systematically correlated with ascorbic acid findings. The disappearance of injected ascorbic acid excess from the blood was found to be an exponential function in time. (Author)

PB-165 936
School of Aerospace Medicine, Brooks AFB, Tex.
CHOLESTEROL UPTAKE IN THE SERUM OF NORMAL AND HOSPITALIZED INDIVIDUALS
Dale A. Clark, Carrie B. Haven, and John J. Franks. 7 Nov 61, 7p
Rept. no. 62-50
OTS $1.10

DESCRIPTORS: *Cholesterol, *Atherosclerosis, Blood serum, Absorption (Biological), Lipids,

The capacity of human serum to dissolve cholesterol was measured by a procedure previously developed. Serum was obtained from 34 normal young men and from 14 patients hospitalized for some manifestations of arteriosclerotic cardiovascular disease. All sera dissolved additional cholesterol. Sera from the hospitalized group dissolved at least as much additional cholesterol as did sera from the normal group. This finding suggests that in atherosclerosis the reserve cholesterol transport capacity is not diminished. This statement must be accepted within the limitations of the method and the unknown effects of therapeutic regimens. The amount of additional cholesterol dissolved by a sample of serum is not correlated with the original concentration of cholesterol in the serum. (Author)

AD-281 391
School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF VIBRATION AND TEMPERATURE ON THE SPECIFIC REACTIVE CAPACITY OF ANTISERUM
Jimmie Lee Flume. 1 Nov 61, 8p
SAM-TDR-62-48
OTS $1.10

DESCRIPTORS: *Immune serums, *Agglutinins, *Antigen-antibody reactions, Erythrocytes, Vibration, Heat.

The effect of heat and shaking on the specific reactive capacity of antiserum was investigated by both precipitation and passive hemagglutination. Results indicate that, while the capacity of the antiserum to precipitate with homologous antigen is destroyed by heat, the antiserum is still capable of causing agglutination of red blood cells sensitized with the antigen. It is possible that in the heat-treated preparations of antiserum, there exist protein molecules of various degrees of denaturation which are detectable by passive hemagglutination but not by the less sensitive precipitation technic. The increase in precipitability observed when antiserum is vigorously shaken might be due to a change in molecular configuration with resulting exposure of antibody reactive sites. (Author)

AD-423 948
School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS ON MAN OF PROLONGED EXPOSURE TO OXYGEN AT A TOTAL PRESSURE OF 190 MM. HG
Thomas E. Morgan, Jr., Frode Ulvedal, Ralph G. Cutler, and B. E. Welch. Sep 63, 10p
SAM-TDR-63-52
OTS $1.10

DESCRIPTORS: *Oxygen, *Space medicine, Barometric pressure, Toxicity, Decompression sickness, Spacecraft cabins, Controlled atmospheres,

Four 17-day experiments were conducted on healthy pilots in the two-man space cabin simulator. Total pressure averaged 192 mm. Hg; partial pressure of oxygen, 174 mm. Hg. This atmosphere was reasonably well tolerated by all test subjects. The symptoms consisted of irritation of the upper respiratory tract, aural atelectasis, and eye irritation. Postexperimentally, 2 of the 8 subjects demonstrated reduced arterial oxygen saturation immediately. Pictures, however, gave no x-ray evidence of pulmonary atelectasis. The incidence of baropathies following decompression from 750 mm. Hg to 190 mm. Hg exceeded 50% (5 of 8 subjects), even following 2 to 3 hours of preoxygenation. The utilization of an atmosphere consisting of oxygen, carbon dioxide, and water vapor at a total pressure of 190 mm. Hg appears to be physiologically feasible, at least for 17 days. Care must be taken to overcome the problem of bends during the initial decompression and to insure that engineering gains are sufficiently great to offset the symptoms noted in these studies. (Author)

The results presented permit certain generalities regarding the survival and multiplication of terrestrial microorganisms exposed to a simulated Martian environment: (1) Certain soil bacteria, capable of physiologic adaptation to a simulated Martian environment, survive and multiply. (2) Sporeforming bacteria appear to have a higher rate of cell multiplication than strictly vegetative cells. (3) A simulated Martian environment including temperature cycling, an environmental characteristic on Mars, appears to yield greater numbers of viable cells than a similar environment maintained at room temperature. (Author)

AD-424 189
School of Aerospace Medicine, Brooks AFB, Tex.
STUDIES WITH A SIMULATED MARTIAN ENVIRONMENT. GERMINATION AND GROWTH OF BACTERIAL SPORES
Thomas L. Roberts and Laurence A. Irvine. Sep 63, 10p
SAM-TDR-63-75; N64-12340
OTS $1.10

DESCRIPTORS: *Clostridium, *Bacteria, *Spores, *Space biology, *Mars, Simulation, Ecology, Moisture, Growth (Physiology)

Simulated Martian microenvironment containing 8% moisture permitted germination and growth of endospores of Clostridium sporogenes. (Author)

Pathology

AD-295 662
Albany Medical Coll., N. Y.
BICARBONATE EXCRETION DURING HYPOTHERMIA
G. S. Kanter. 26 Jul 62, 9p
Contract AF41(657)393
SAM-TDR-62-123
OTS $1.10

DESCRIPTORS: *Hypothermia, *Bicarbonates, Excretion, Acidosis, Urine, Dogs,

The investigation was designed to determine whether the renal loss of bicarbonate contributes significantly to the acidosis of hypothermia. Excretion of bicarbonate during hypothermia was studied in 5 infused (6% creatinine in saline at 0.4 ml./min.) and 5 noninfused dogs. Animals were anesthetized; artificial respiration was not used. In the noninfused group, bicarbonate excretion did not increase significantly during hypothermia. Urinary pH remained at control levels of about 6.2. The fall in arterial pH was therefore not due to urinary bicarbonate loss. Conversely, the urinary pH in the infused group increased to 6.7 because of increased excretion of bicarbonate. Increased excretion in this group was statistically significant at the 27° C. level. Urine pH in the 3 animals with the highest urine flow in the latter group did approach plasma levels of pH 7.0. In spite of the increased renal loss of bicarbonate in the infused group, insufficient bicarbonate was excreted to accoutn for the decrease in arterial pH. Considering the fall in arterial pH, it is striking that the hypothermic kidney in both groups was not able to acidify the urine. (Author)

AD-295 588
Albany Medical Coll., N. Y.
RENAL REGULATION OF BICARBONATE LOADS DURING HYPOTHERMIA
G. S. Kanter. 21 Aug 62, 10p
Contract AF41(657)393
SAM-TDR-62-133
OTS $1.10

DESCRIPTORS: *Hypothermia, *Bicarbonates, Excretion, Urine, Kidneys, Dogs, Acidosis,

The ability of the hypothermic kidney to handle massive exogenous bicarbonate loads was studied in 5 dogs given 2.6% $NaHCO_3$ plus 0.75% creatinine and 0.1% PAH intravenously at the rate of 4.0 ml./min. The renal hemodynamic pattern was typical of hypothermia with decreasing GFR, RPF, and blood pressure, along with increasing renal resistance. Urine pH rose to 7.95 while arterial pH, corrected to body temperature, reached a maximum of 7.56 and then slowly declined to 7.51 at 27° C. The acidosis of hypothermia is difficult to counteract. In spite of the fall in GFR, the urine flow, under the influence of the hyperosmotic load, increased progressively throughout the exposure. A depressing effect of cold on tubular transport of bicarbonate was seen. Although the bicarbonate load presented to the tubules remained near control levels, the reabsorption of bicarbonate fell from a normothermia value of 1.5 mEq./min. to 0.9 mEq./min. at 27° C. (Author)

PB-165 895
Florida Univ., Gainesville, Coll. of Medicine.
EFFECTS OF THE COMPRESSIBILITY OF ALVEOLAR GAS ON THE DYNAMICS AND WORK OF BREATHING
M. J. Jaeger and A. B. Otis. 19 Jun 63, 19p
Contract AF41(609)1553
SAM-TDR-63-71
OTS $1.60

DESCRIPTORS: *Respiration, *Diagnostic agents, Diseases, *Lungs, Medical examination, Plethysmography, Air, Measurement, Pressure, Volumetric analysis

Alveolar gas is compressed and expanded during every breathing cycle. The volume displacement measured at the mouth V_T (tidal volume) is therefore smaller than the volume displacement of the lung V'_T that may be measured with a body plethysmograph. Experimental data found in normal subjects and in patients with obstructive emphysema confirm the theory that the ratio V_T/V'_T decreases with increasing airway resistance, breathing frequency, and lung volume. There was little effect in normal subjects breathing at different breathing rates; however, in patients with obstructive emphysema it may be appreciable. With increasing altitude, the effect is expected to be more pronounced. The mechanical work performed in compressing and expanding alveolar gas may be determined by recording the volume displacement of the lung simultaneously with tidal volume and intra-esophageal pressure. Normally, work related to compressibility is insignificant, but in patients with obstructive emphysema, it becomes appreciable during hyperpnea. The compressibility of alveolar gas was also found to increase the negative work performed by respiratory muscles. (Author)

AD-425 692
School of Aerospace Medicine, Brooks AFB, Tex.
ORAL GLUCOSE TOLERANCE RESPONSES IN HEALTHY YOUNG ADULT MALES CLASSIFIED AS TO CARIES EXPERIENCE AND PERIODONTAL STATUS
Ira L. Shannon and William A. Gibson. 25 Jul 63, 12p
SAM-TDR-63-87
OTS $1.60

DESCRIPTORS: *Teeth, Diseases, Mouth, *Glucose, Tolerances (Physiology), *Carbohydrates, *Metabolism, Diabetes, *Dentistry, Blood chemistry,

Oral glucose tolerance tests were performed for 300 systemically healthy male subjects between 17 and 22 years of age. Subjects were classified as to caries experience and periodontal status. All serum samples, a total of 1,500 were analyzed for glucose by two chemical methods. The results of an automatic ferricyanide procedure were compared to those from an enzymatic procedure with a specificity for glucose. There was no indication that either caries experience or periodontal status was in any way related to glucose tolerance results for these subjects. (Author)

AD-403 595
School of Aerospace Medicine, Brooks AFB, Tex.
RELIABILITY OF SKIN TESTS FOR NASAL ALLERGY. RESULTS OF TESTING 100 RANDOMLY SELECTED AIRMEN AND TEST-RETEST RESULTS ON A SMALLER SAMPLE
Lois L. Elliott and William L. Watson. Nov 62, 14p
SAM-TDR-62-129
OTS $1.60

DESCRIPTORS: *Allergy, *Skin, *Medical examination, Reliability, Air Force personnel, Otorhinolaryngology.

Thirteen intradermal skin tests for nasal allergy and a control were administered once to a sample of 100 airmen selected randomly and on two occasions to a test-retest sample of 26 subjects. Skin responses were measured independently by two technicians and evaluated by a physician. Results showed high inter-technician agreement and good test-retest consistency when the 10 mm. wheal diameter criterion for a positive response was used. Self-reports of allergic reactions did not correspond well with skin test responses. In the sample of 26 test-retest subjects, results remained consistent over a one-month period for a high percentage of responses. (Author)

AD-279 089
School of Aerospace Medicine, Brooks AFB, Tex.
PROCEDURES FOR ROUTINE LABORATORY DIANNOSIS OF VIRUS AND RICKETTSIAL DISEASES
Seymour S. Kalter and William D. Hillis. 19 Jul 61, 56p
Rept. no. 62-10
OTS $5.60

DESCRIPTORS: *Diagnosis, *Viruses, *Rickettsia, Diseases, Histological techniques

AD-425 600
School of Aerospace Medicine, Brooks AFB, Tex.
SERUM PROTEINS IN RELATION TO PERIODONTAL STATUS AND CARIES EXPERIENCE
Ira L. Shannon and William A. Gibson. 18 Jul 63, 7p
SAM-TDR-63-81
OTS $1.10

DESCRIPTORS: *Teeth, Diseases, *Blood proteins, Mouth, *Serum albumin, *Globulins, Public health, Dentistry,

Correlations were sought between oral health status and serum total protein, albumin, and globulin levels for 515 systemically healthy young adult males. No highly significant correlations were found between either DMFS or periodontal status with any of the serum components under study. (Author)

PB-165 946
School of Aerospace Medicine, Brooks AFB, Tex.
A STUDY OF PERSONALITY CHARACTERISTICS IN PATIENTS WITH TEMPOROMANDIBULAR JOINT SYMPTOMS
Clarence M. McCall, Jr., Lucian Szmyd, and Richard M. Ritter. 30 Nov 59, 9p
Rept. no. 60-46; AD-238 115
OTS $1.10

DESCRIPTORS: *Personality, Psychophysiology, *Joints (Physiology), Diagnosis, Pain, Head, *Dentistry, Behavior, Anxiety, Reaction (Psychology),

A standard personality inventory to compare certain characteristics of 70 temporomandibular joint patients with those of 70 control subjects selected from among routine dental examinees to match the experimental group on age, sex, marital status, and military rank or occupation is utilized. A third matched group of patients who were about to undergo oral surgery was included to evaluate the role of immediate situational anxiety in the temporomandibular joint syndrome. The findings indicated that patients who manifested disturbances of the temporomandibular joint tended to respond to items of a standard personality inventory in a predictable manner, which deviated from the manner of responding of a matched, normative group. Second, the finding of a subgroup of items, most of which discriminated temporomandibular joint patients on the basis of behavioral content that cannot readily be interpreted as a simple pain or discomfort response, suggests that this content may, in fact, reflect yet undefined personality characteristics underlying the temporomandibular joint syndrome. (Author)

AD-426 027
School of Aerospace Medicine, Brooks AFB, Tex.
TIME-CONCENTRATION EFFECTS IN RELATION TO OXYGEN TOXICITY IN MAN
B. E. Welch, T. E. Morgan, Jr., and H. G. Clamann. Oct 63, 16p
Review 9-63; N64-12864
OTS $1.60

DESCRIPTORS: *Oxygen, *Toxic tolerances, Toxicity, Pressure, Dosage, Humans.

A partial review is given of research concerning the toxic effects on man of oxygen, both at high and low oxygen partial pressure. A brief discussion is given of oxygen toxicity symptoms.

AD-279 091
School of Aerospace Medicine, Brooks AFB, Tex.
IMMUNOCHEMISTRY OF COAGULATED ANTIGEN-ANTIBODY COMPLEXES
G. Bonner Sutherland (Univ. of Kansas) 16 May 61, 15p
Rept. no. 61-95
OTS $1.60

DESCRIPTORS: *Immune serums, Immunity, Biochemistry, *Antigens and antibodies, Antigen-antibody reactions, Gamma globulin, Coagulation, Proteins (Derived).

Under suitable conditions rabbit antibody or antigen-antibody complexes may be coagulated so that the antibody will retain some of its combining sites. Such insoluble (fixed) antibody or antigen-antibody complexes may be used as specific adsorbents for antigen, and the antigen may be released subsequently by increasing the acidity. The procedure would appear to make possible the isolation of abnormal proteins which may be present in disease states, either acquired or hereditary The present study comprises an analysis of suitable conditions for coagulation of the antigen-antibody complexes and of the conditions for the adsorption and elution of the antigen. (Author)

PB-165 935
School of Aerospace Medicine, Brooks AFB, Tex.
LIPID COMPONENTS OF SOUND AND CARIOUS DENTIN
Thomas R. Dirksen. 27 Oct 61, 5p
Rept. no. 62-47
OTS $1.10

DESCRIPTORS: *Lipids, *Teeth, Diseases, Decomposition, Cholesterol, Phospholipids, Inositols, *Dentistry,

Alcohol-ether extracts of the lipid components of sound and carious dentin, were subjected to paper chromatography and specific chemical tests. The presence of cholesterol esters, triglycerides, fatty acids, cholesterol, diglycerides, and various phospholipids was demonstrated in the sample materials. Sound dentin was found to contain inositol phosphatide, sphingomyelin, lecithin, and two unidentified phosphatides which are believed to be polyglycerol phosphatides and phosphatidic acids. Decayed material contained sphingomyelin, lecithin, phosphatidylethanol amine, and phosphatidylserine, and other phosphatides which had undergone various degrees of degradation. (Author)

AD-403 092
School of Aerospace Medicine, Brooks AFB, Tex.
A METHOD FOR SELECTING AN ORAL HYGIENE TECHNIC FOR USE IN SPACE CABIN SIMULATOR FLIGHTS
Clarence M. McCall, Jr., Lucian Szmyd, Bryce O. Hartman, Billy E. Welch, and Richard E. McKenzie. Jan 63, 12p
SAM-TDR-62-110; N64-10558
OTS $1.60

DESCRIPTORS: *Teeth, Mouth, Bacteria, *Cleaning, Public health, Toilet articles, *Space flight, Spacecraft cabins, Flight simulators.

Five oral hygiene technics were evaluated for use in the USAF space cabin simulator and, ultimately, in actual space missions. The control technic consisted of the use of toothbrush, dentifrice, dental floss, and water rinse. The oral hygiene methods evaluated were: (1) chewing gum only; (2) toothbrush only; (3) toothbrush and dental floss; and (4) toothbrush and water rinse. Each method was tested for ten days. By use of both objective and subjective measurements, the toothbrush and dental floss method was proved to be as effective as the accepted use of toothbrush, dentifrice, dental floss, and water rinse in maintaining good oral hygiene. The degree to which good oral hygiene is maintained depends on the individual. (Author)

AD-425 477
School of Aerospace Medicine, Brooks AFB, Tex.
MICROORGANISMS IN HUMAN GINGIVAL TISSUES
William A. Gibson and Ira L. Shannon. 25 Jul 63, 7p
SAM-TDR-63-88; N64-13865
OTS $1.10

DESCRIPTORS: *Mouth, *Bacteria, Microorganisms, Diseases, Tissues (Biology), Biological stains, Histological techniques, Humans

Gingival strip biopsies were taken from areas of obvious inflammation in 191 systemically healthy young adult males. For 72 of these subjects, a thorough oral prophylaxis was performed 24 hours prior to experimental participation. The remaining 119 subjects received no dental treatment of any type and served as controls. Serial sections were stained by four different methods: hematoxylin-erosin, the Brown and Brenn modification of the Gram stain, the Grocott modification of the Gomori's methenamine-silver nitrate technic, and a combined Gram and Twort's staining technic formulated in this laboratory. Bacteria were found in the gingival tissues of approximately 10% of the nontreated subjects and 60% of those who received oral prophylaxis. These findings were held to be inconsistent with the premise of active bacterial invasion in gingival inflammation. (Author)

PB-165 918
School of Aerospace Medicine, Brooks AFB, Tex.
OCCURENCE OF PROTEUS IN CAPTIVE MACACA MULATTA
Anna C. Garner. 23 Sep 60, 4p
Rept. no. 61-32; AD-254 752
OTS $1.10

DESCRIPTORS: *Proteus, Proteus vulgaris, Monkeys, Enterobacteriaceae, Etiology, *Digestive system diseases, Diarrhea, Gastrointestinal system,

Proteus morgani has been implicated as the etiologic agent in sporadic cases of enteritis in monkeys. Rectal swab cultures from 264 Macaca mulatta were examined for this organism, as well as for other species of Proteus. P. mirabilis was detected in 177, P. morgani in 78, P. rettgeri and 2, and P. vulgaris in 1. Direct plating to SS agar (76 positives) was far superior to selenite-F enrichment broth (3 positives) in isolating P. morgani. (Author)

The effect of five different central nervous system drugs on ten enzyme systems in rat brain were studied on a group of approximately 650 rats. Significant alterations of enzyme activity were noted with pentobarbital (malic dehydrogenase and hexokinase); chlorpromazine (lactic dehydrogenase); dexedrine (hexokinase); meprobamate (hexokinase and lactic dehydrogenase); and reserpine (enolase and myokinase). The following enzyme systems were unaffected by any of the drugs used: aldolase, glutamic oxalacetic transaminase, glutamic pyruvic transaminase, phosphoglycerokinase, and glyceraldehyde phosphate dehydrogenase. The fact that none of the drugs studied exert an influence on what appear to be rate-limiting steps in glycolysis (phosphoglycerokinase and glyceraldehyde phosphate dehydrogenase) makes it highly unlikely that these drugs produce their metabolic effects on this pathway of glucose utilization. (Author)

PB-165 881
School of Aerospace Medicine, Brooks AFB, Tex.
OTOTOXIC DRUGS
Raymond O. Waters. Oct 60, 11p
Review 5-60; AD-253 002
OTS $1.60

DESCRIPTORS: Drugs, Toxicity, Ear, *Hearing, Cinchona alkaloids, Streptomycins, Neomycins, Antibiotics, Otorhinolaryngology,

AD-280 419
School of Aerospace Medicine, Brooks AFB, Tex.
PORTAL VENOUS NITROGEN MUSTARD INFUSION: THE EFFECT ON LIVER FUNCTION AND HEMATOPOIESIS WITH PROTECTIVE AGENT
Cecil C. Beehler. 2 Oct 61, 8p
Rept. no. 62-35
OTS $1.10

DESCRIPTORS: *Nitrogen mustards, *Liver function tests, Liver, *Hemopoietic system, Chemotherapeutic agents, Leucocytes, Parenteral infusions, Thiosulfates, Sodium compounds,

Twelve animals were studied to determine baseline liver function and white blood-cell levels. Four animals received a standard dose of nitrogen mustard administered directly into the portal vein. A calculated dose of a chemical antagonist (sodium thiosulfate) was then administered intravenously as a protective substance. A control group received an equal dose of nitrogen mustard without sodium thiosulfate. A second control group of four animals received a volume of saline in the same way. The full therapeutic dose of nitrogen mustard injected directly into the portal vein did not result in disturbance of any of the liver-function tests studied. Sodium thiosulfate, administered in the manner described, offers no protection for the hematopoietic system as reflected in the white blood count. The limiting factor to the use of nitrogen mustard is still its effect on the hematopoietic system. (Author)

PB-165 907
School of Aerospace Medicine, Brooks AFB, Tex.
THE PROTECTION OF MICE AGAINST RADIATION BY 2-MERCAPTOETHYLGUANIDINE AND ITS DISULFIDE
Emanuel E. Schwartz and Bernard Shapiro (Albert Einstein Medical Center) 28 Jul 60, 6p
Rept. no. 61-15; AD-253 004
OTS $1.10

DESCRIPTORS: *Radioprotective agents, Organic sulfur compounds, *Guanidines, Sulfides, Toxicity, Dosage, Mice

The ability of 2-mercaptoethylguanidine (MEG) to protect irradiated mice was compared with that of its oxidized form, bis(2-guanidoethyl) disulfide. When administered intraperitoneally, 100 and 140 mg./kg. of each form gave comparable $LD_{50/30}$ results. However, GED in doses of 200 mg./kg. and above gave rise to signs of drug toxicity which apparently prevented a further increase in protection such as was obtained with equivalent doses of MEG. The therapeutic efficiency of GED, as compared with MEG, was not increased by use of the oral route, despite the increased tolerance to the disulfide. (Author)

PB-165 922
School of Aerospace Medicine, Brooks AFB, Tex.
PROTECTION OF RAPIDLY DECOMPRESSED RATS BY PHARMACOLOGIC AND PHYSICAL MEANS
Carl B. Lyle, Jr. and Elmer V. Dahl. 25 May 61, 7p
Rept. no. 61-101
OTS $1.10

DESCRIPTORS: *Decompression sickness, Drugs, *Injections (Medical), Solutions, *Peritoneum, CNS depressants, Autonomic agents, Inhibition, Abdomen, Rats,

Seventy-two percent of rats decompressed from an ambient pressure of 520 mm. Hg to 30 mm. Hg in 0.075 second died. Only 12 to 37 percent of animals treated before decompression with drugs acting on the nervous system died. No rats given a local anesthetic agent intraperitoneally prior to decompression died, and no rats whose abdomens were tensely distended with intraperitoneal saline before decompression died. In each experimental group, mortality was significantly correlated with increased lung weight. These observations lead to the speculation that, in rats, the sudden distention of gas-containing abdominal viscera has indirect, perhaps reflex, effects which are related to the development of pulmonary edema and to the survival of the animals. (Author)

PB-165 917
School of Aerospace Medicine, Brooks AFB, Tex.
SERUM AND URINE 17-HYDROXYCORTICOSTEROID LEVELS FOLLOWING SMALL ORAL DOSES OF SYNTHETIC ANALOGS OF HYDROCORTISONE
John R. Prigmore and Ira L. Shannon. 13 Sep 60, 7p
Rept. no. 61-31:AD-254 751
OTS $1.10

DESCRIPTORS: *Corticosteroid agents, Alcohols, *Blood serum, *Urine, Dosage,

The influence of single, low dose levels of hydrocortisone analogs on serum and urine 17-hydroxycorticosteroids was studied. With the exception of medrol, the drugs employed promoted levels of 17-OHCS which tended to parallel in serum and urine, but differed in magnitude of alteration. The possible significance of these findings is discussed. (Author)

AD-426 121
School of Aerospace Medicine, Brooks AFB, Tex.
URINARY CATECHOLAMINES IN MOTION SICKNESS AND TURBULENT FLIGHT
Joseph L. Borowitz, Elmer J. Schultz, and William W. Lackey. Nov 63, 8p
SAM-TDR-63-9
OTS $1.10

DESCRIPTORS: *Epinephine, *Levarterenol, *Motion sickness, *Urine, Flight, Turbulence, Amines, Emesis.

Urine samples were collected from 65 young airmen both before and after they were subjected to turbulent motion in C-47 aircraft. Similar samples were collected from 31 young airmen who were taken on flights during which no turbulence was voluntarily induced. These acidified but unboiled urines were analyzed for "free" catecholamines. Neither norepinephrine nor epinephrine output in urine was related to vomiting or sweating during the turbulent flights. The output of norepinephrine and epinephrine was significantly greater during turbulent flights than during flights in which no turbulence was induced. Urinary epinephrine output was also significantly increased during the turbulent flights as opposed to the preflight period. Changes in urinary catecholamine output during flying are therefore associated with turbulence, but appear to be distinct from the motion-sickness syndrome. (Author)

Pharmacology and Toxicology

PB-165 328
Army Medical Research Lab., Fort Knox, Ky.
THE POTENTIATION OF OPIATE INDUCED ANALGESIA BY STIMULANT DRUGS. I: THE EFFECT OF MONOAMINE OXADASE INHIBITORS AND CAFFEINE.
Rept. on Psychomotor Function in Relation to Performance
Wayne O. Evans. 13 Nov 61, 10p
Rept. no. 519
OTS $1.10

DESCRIPTORS: *Analgesics and antipyretics, *Narcotics, *Amphetamines, *Purine alkaloids, CNS stimulants, *Oxidoreductases, Inhibition.

An experiment was performed to test the hypotheses that either general excitement or an inhibition of MAO was the mechanism by which amphetamine potentiates an opiate induced analgesia. Codeine was administered alone or in combinations with amphetamine, iproniazid, caffeine, PIH, and JB 835 to rats. Analgesia was tested using a "jump" threshold procedure. The results showed that codeine plus amphetamine potentiated analgesia and that codeine plus caffeine antagonized analgesia. None of the other combinations had a significant effect. These results are interpreted as failing to support either the hypothesis of general excitement or that of MAO inhibition as the mechanism of the amphetamine potentiation effect (Author)

AD-421 848
Harvard Univ., Boston, Mass. Medical School
CATECHOLAMINE RELEASE FROM ADRENAL SLICES AND RATE OF RESPIRATION
P. R. Draskoczy, W. R. Burack, and N. Weiner.
9 Apr 63, 13p
Contract AF41(657)414
SAM-TDR-63-50; N64-12835
OTS $1.60

DESCRIPTORS: *Pyrocatechol, *Adrenal glands, Secretion, Tissue extracts, *Oxygen consumption, Drugs, Reserpine,

The oxygen consumption of, and the catecholamine release from, incubated fowl adrenal slices were studied under control conditions and during exposure to several chemical agents - i.e., potassium ion, reserpine, tyramine, and 2,4-dinitrophenol. Potassium ion, given as KCl, 0.1 M, and tyramine, 7.3×10^{-3} M, did not alter the respiration rate but did increase the rate of catecholamine release. Reserpine, 3.3×10^{-5} M, depressed the rate of respiration but did not affect the rate of release of catecholamines. 2,4-dinitrophenol, 7×10^{-5} M, caused an immediate, marked increase in oxygen consumption unaccompanied by any change in the rate of release of catecholamines over a period of 2 hours. Subsequently, the rate of release exceeded control values. (Author)

PB-165 932
School of Aerospace Medicine, Brooks AFB, Tex.
ALTERATION OF RESPONSE OF DOGS TO CEREBRAL AEROEMBOLI BY PRETREATMENT WITH PROCAINE HYDROCHLORIDE
Carl B. Lyle, Jr., and John B. Fitzgerald. 10 Jul 61, 6p
Rept. no. 62-5
OTS $1.10

DESCRIPTORS: Space medicine, Dogs, Drugs, Adaptation (Physiology), Arteries, Embolism, *Gas embolism, *Cerebrum, *Local anesthetics, Injections (Medical).

The effect of pretreatment with intracarotid procaine hydrochloride on the consequences of intracarotid injection of air was studied in dogs. The results indicate that this pretreatment provides a protective effect. This effect is presumably due to the prevention of vascular spasm usually caused by aeroemboli. The results are not conclusive with regard to the beneficial effect of intra-arterial procaine therapy in clinical cases of aeroemboli, but it would appear that, in view of the lack of deleterious effects in anesthetized subjects, its use could be considered in selected cases. (Author)

PB-165 925
School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECT OF CENTRAL NERVOUS SYSTEM DRUGS ON THE ENZYME ACTIVITY OF RAT BRAIN
Harry G. Albaum (Brooklyn Coll.). 25 May 60, 9p
Rept. no. 60-86; AD-250 983
OTS $1.10

DESCRIPTORS: *CNS depressants, *CNS stimulants, *Barbiturates, Amines, *Chlorpromazine, *Tranquilizers, *Reserpine, *Enzymes, Lactates, *Oxidoreductases, Malic acid, *Aldehyde-lyases, *Transferases, Glutamic acid, Oxalacetic acid, Rats, Brain, Pyruvic acid, *Phosphorus transferases

Serum response of the rabbit and the dog also failed to demonstrate this very early hyperglycemia. Additional monkeys were then irradiated and in a program utilizing chemical protective compounds it was observed that the preadministration of certain protective materials modified the hyperglycemic response. (Author)

AD-280 432
School of Aerospace Medicine, Brooks AFB, Tex.
RADIOPROTECTIVE AGENTS. CELLULAR RESPONSE TO PREIRRADIATION TREATMENT WITH YEAST RNA
Donald E. Rounds (Pasadena Foundation for Medical Research) 12 Jul 61, 7p
Rept. no. 62-7
OTS $1.10

DESCRIPTORS: *Radioprotective agents, *Cells (Biology), Radiation effects, *Yeasts, *Ribonucleic acids,

The Fernandes strain of amnion cells treated with yeast RNA (0.01 to 0.5 mg./ml.) 24 hours before 700 r gamma radiation showed increased survival over untreated cultures. A minimum RNA treatment time of 8 to 10 hours was necessary to elicit a protective response in irradiated amnion cells. A dose response curve over a 0 to 700 r range indicated cell survival as being represented by parallel lines rather than diverging lines. A delay in the onset of radiation damage to treated cultures was suggested. Daily counts indicated that treated cells multiplied at a normal rate of growth for 2 days postradiation as compared with an immediate inhibition of growth in untreated irradiated cultures. RNA protection appeared to operate on a mechanism which was different from that for thiol protection. (Author)

CHEMISTRY

IS-800
Ames Lab., Iowa State Univ. of Science and Tech.
CHEMICAL ANALYSIS OF ALKALI METAL TUNGSTEN BRONZES
Bruce Alan Raby and Charles Banks. Nov 63, 92p
Contract W7405-eng-82
OTS $2.00

IS-770
Ames Lab., Iowa State Univ. of Science and Tech.
OSMOTIC AND ACTIVITY COEFFICIENTS OF SOME AQUEOUS RARE-EARTH CHLORIDE SOLUTIONS AT 25°C
Harry Homer Petheram and F. H. Spedding. May 63, 74p
Contract W7405-eng-82
OTS $1.75

DESCRIPTORS: *Rare earths, Erbium, Yttrium, *Chlorides,

IS-741
Ames Lab., Iowa State Univ. of Science and Tech.
PREPARATION AND REACTIONS OF SOME LOWER TUNGSTEN HALIDES AND HALIDE COMPLEXES
Theodore Martin Brown and Robert McCarley. Nov 63, 117p
Contract W7405-eng-82
OTS $2.50

DESCRIPTORS: *Tungsten, *Chlorides, *Bromides, *Pyridines, *Complex compounds.

AD-423 390
British Columbia Univ., Vancouver (Canada).
VOLATILE FLUORO COMPOUNDS. Final rept., 15 Jul 58-31 Aug 63
H. C. Clark. Aug 63, 62p
Contract Nonr-2659(00)
OTS $1.75

DESCRIPTORS: *Fluorides, Transition elements, *Vanadium compounds, Chromium compounds, Group III elements, Group IV elements, *Metalorganic compounds, Tin compounds, *Silanes,

The report summarizes the significant research results of the contract. The project was concerned with two aspects of fluorine chemistry; firstly, the study of volatile fluorides of transition metals and their derivatives, and secondly, the synthesis and study of perfluoroalkyl derivatives of elements of groups IIIA and IVA. Also included are papers entitled: Studies with a perfluoroalkyl-silicon compound; Reactions of organotin compounds-the stability of dimethyltin dihydride, and additions to some fluoro-olefins; Some reactions of chromium tetrafluoride. (See also AD-409 921)

UCRL-10925
Lawrence Radiation Lab., Univ. of California, Berkeley.
PROGRAMS FOR CALCULATING RELATIVE INTENSITIES IN THE VIBRATIONAL STRUCTURE OF ELECTRONIC BAND SYSTEMS
Richard N. Zare. 19 Nov 63, 60p
Contract W7405-eng-48
OTS $1.50

UCRL-11252
Lawrence Radiation Lab., Univ. of California, Berkeley.
THE REACTION OF FERRICYANIDE WITH BOROHYDRIDE IN AQUEOUS SOLUTION
Lydia S. Hsu. Master's thesis. Jan 64, 28p
Contract W7405-eng-48
OTS $0.75

NASA-TN-D-2276
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EXPERIMENTAL DETERMINATION OF SODIUM VAPOR EXPANSION CHARACTERISTICS WITH INERT-GAS-INJECTION PRESSURE-MEASURING TECHNIQUE
Landon R. Nichols, Stanley M. Nosek, Charles H. Winzig, and Louis J. Goldman. Apr 64, 37p
N64-18961
OTS $1.00

DESCRIPTORS: Alkali metals, *Sodium, *Vapors, Physical properties.

PB-165 940
School of Aerospace Medicine, Brooks AFB, Tex.
AN ANALYSIS OF THE $LD_{50/30}$ AS RELATED TO RADIATION INTENSITY
Loren C. Logie, Milford D. Harris, Robert E. Tatsch, and Eugene N. Van Hooser. 15 Jul 59, 7p
Rept. no. 60-10; AD-231 547
OTS $1.10

DESCRIPTORS: *Radiological dosage, *Dose rate, *Radiation effects, Cobalt, Radioactive isotopes, Test facilities, Dosimeters, Radiobiology, Gamma rays, Survival, Mathematical analysis

Using Co^{60} as a radiation source with an energy averaging about 1.2 Mev, and using lethality as the radiobiologic end point in the rat, an apparent relationship of radiation intensity to the biological effect $LD_{50/30}$ was found. In addition, 3 equations relating effective dose to the radiation time and intensity are presented. Because of the time lag between the radiation exposure and the onset of lethality, 2 postulates were presented: (a) the effective injury is a function of the total radiation given, minus a dose equivalent to that rendered ineffective because of a repair process; and (b) when the effective dose exceeds a certain value, lethality can be predicted. If a rapid component of repair exists, then the data of the present experiment may have been misinterpreted. The data of this work, however, appear to show a high degree of correlation between the intensity of the administered radiation and the biologic end point, $LD_{50/30}$. This relationship could be a coincidental correlation to a rapid recovery phase rather than an actual effect of intensity. (DDC abstract)

PB-165 883
School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF ACUTE RADIATION EXPOSURE ON HUMAN PERFORMANCE
Robert B. Payne. Feb 63, 29p
Review 3-63; N63-14789
OTS $2.60
Gatlinburg Symposium on Protection Against Radiation Hazards in Space, 6 Nov 62

DESCRIPTORS: *Radiation effects, *Motor reactions, *Psychomotor tests, Radiation tolerance, Performance (Human), Behavior, Space medicine.

More than fifty studies of anthropoid behavior observed under various kinds, rates, and amounts of ionizing radiation have shown, on balance, that behavioral functions are highly resistant to acute whole-body doses well above those required to produce troublesome manifestations of acute radiation sickness. (Author)

PB-165 921
School of Aerospace Medicine, Brooks AFB, Tex.
HEMATOLOGIC EFFECTS INDUCED BY PERIODIC EXPOSURES OF MONKEYS (MACACA MULATTA) TO GAMMA RAYS
Robert J. Young, George S. Melville, Jr., Henry Borella, and John E. Pickering. 22 Nov 60, 12p
Rept. no. 61-53
OTS $1.60

DESCRIPTORS: *Radiation effects, Monkeys, Whole body irradiation, Hematology, *Hematocrit, Gamma rays, *Blood cells,

Twenty-three monkeys (Macaca mulatta) were divided into four groups and exposed periodically to low doses of gamma rays from Co^{60}. The irradiated groups received 154, 274, and 590 rep total dose which was divided into doses administered every four days for 40 exposures. The cellular elements of the peripheral blood, hemoglobin, and hematocrit values were sampled and enumerated at intervals postirradiation. An analysis of variance was performed on the data from those animals surviving to 24 weeks postirradiation. These surviving monkeys re-established normal hematologic values by the end of the 24-week period. No statistically significant results were obtained for any parameter measured which would be interpreted as a radiation effect. (Author)

AD-423 076
School of Aerospace Medicine, Brooks AFB, Tex.
LATENT EFFECTS OF CHRONIC IRRADIATION ON LONGEVITY AND THE PERIPHERAL BLOOD ELEMENTS OF THE MONKEY, MACACA MULATTA
Donald R. Anderson. Sep 63, 9p
SAM-TDR-63-55; N64-13078
OTS $1.10

DESCRIPTORS: *Radiation effects, *Life span, *Monkeys, Radiological dosage, Blood, Gamma rays, Neutrons.

One of the problem areas of radiation biology is concerned with the latent or long-term effects of the biologic damage that might result from chronic low dose levels of ionizing radiation. The report presents data from a study in the primate, Macaca mulatta, over a period of several years following a chronic irradiation schedule resulting in accumulated doses of 77 to 614 rep of mixed gamma and neutron radiations. Although the circulating blood elements are considered to be sensitive to radiation damage, they recovered, following the irradiation schedule, to essentially normal condition and showed no long-term decrement due to the radiation exposure. Longevity in the limited number of animals utilized also indicated no change due to radiation. (Author)

AD-418 269
School of Aerospace Medicine, Brooks AFB, Tex.
POSTIRRADIATION HYPERGLYCEMIA IN THE PRIMATE
Donald R. Anderson, Alexander Hernandez-Diaz and Frances A. Quinn. 12 Mar 63, 8p
SAM-TDR-63-40; N63-22665
OTS $1.10

DESCRIPTORS: *Hyperglycemia, *Radiation effects, *Metabolism disorders, *Primates, *Radioprotective agents, Monkeys, Rats, Rabbits, Carbohydrates,

Alteration in carbohydrate metabolism resulting from radiation exposure is extensively reported in the literature. Plasma glucose elevation in rats was found to reach a maximum at 2 to 4 days postirradiation. In other species the level of liver glycogen increased after irradiation. In a study of changes of serum composition following acute radiation in the Macaca mulatta primate, a marked hyperglycemia was observed within 30 minutes. At 2 hours the glucose level was considerably reduced and was essentially normal ta 4 hours postirradiation. To relate this phenomenon with other species previously reported, rats were irradiated; they did not respond to this immediate "glucose burst."

PB-165 258
Defense Research Lab., Univ. of Texas, Austin.
THE THERMAL INITIATION OF ALPHA LEAD AZIDE. Final rept., Appendix A
Otto H. Hill and A. F. Wittenborn. 31 Jul 57, 56p
Contract DA44-009-ENG-2566
Rept. no. DRL-A-125; AD-202 507
OTS $5.60

DESCRIPTORS: *Lead compounds, *Azides, *Pyrolysis, Detonations, Reaction kinetics, Vacuum, Barometric pressure, *Explosive materials, Tests.

An experimental study of phenomena associated with the onset of initiation of alpha lead azide in vacuum and at atmospheric pressure is presented. Vacuum studies of thermal decomposition included (a) the decomposition history prior to the onset of detonation, (b) the effect of thermal history upon time to explosion characteristics of the explosive, the so-called thermal "memory", and (c) the effect of metallic powder dilution of the explosive powder sample upon the thermal decomposition and initiation characteristics of the explosive. The effect of environmental pressure upon the time to explosion characteristics of α-lead azide was also studied. (Author)

EARTH SCIENCES

N64-18480
Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
THE MAGNETOSPHERIC CUT-OFF FOR 1.5 MEV EXTRA-TERRESTRIAL PROTONS
C. Y. Fan, J. A. Simpson, and Edward C. Stone.
Feb 64, 9p
Grant NsG-179-61; Contract AF19(628)2473; Grant AF AFOSR-62-23
EFINS-64-5; NASA CR-53180
OTS $1.10

DESCRIPTORS: Terrestrial magnetism, *Protons, Upper atmosphere.

PB-165 318
Northwestern Univ., Evanston, Ill.
GEOMORPHOLOGY OF THE LAKE MICHIGAN SHORELINE. Final rept.
William E. Powers. Mar 58, 151p
Contract Nonr-122807
AD-160 064
OTS $11.50

DESCRIPTORS: *Great Lakes, *Geological survey, *Structural geology, Drainage, Terrain, Stratigraphy, Erosion, *Lakes, *Beaches, *Mapping.

The Lake Michigan Basin: General description, drainage, relief, coastal landforms types, geological setting of the Lake Michigan Basin, exposed bedrock geology (Ordovician, Silurian, Devonian, Mississippian, unconsolidated mantle, and geological structure), and relation of Lake Michigan Basin to moraines. Physiographic units of the Lake Michigan shore: Physical elements of the shore zone including elements present, a code for mapping elements of the shore zone, associations of coastal features of Lake Michigan, and description of Lake Michigan shore zone in terms of physiographic units. Present and past changes in shore zone; Shore-processes (progradation and retrogradation), former studies of shoreline changes, remeasurements of the Lake Michigan shore at identifiable points, and relation of shore changes to lake levels. Applicability of shoreline studies on Lake Michigan to other large inland lakes: Comparable large lakes elsewhere. List of plates and section maps: Location of shoreline section maps of Lake Michigan, measured erosion and accretion maps of the Lake Michigan shoreline, and section maps of the Lake Michigan shoreline which show physiographic units and characteristics of the shore zone by symbols. (DDC abstract) (See also PB-165 121)

OTS SB-532
Office of Technical Services, Dept. of Commerce, Washington, D. C.
EARTH SCIENCES. PART III: PL-480 TRANSLATION PROGRAM. Feb 64, 8p
OTS Selective Bibliography SB-532.
OTS $0.10

DESCRIPTORS: *Bibliographies, Earth, *Meteorology, *Geology, *Hydrology

Lists 113 translations financed with currencies accrued in Israel, Poland and Yugoslavia as a result of sale abroad of American surplus agricultural commodities. Material selected by scientists of U.S. agencies participating in this program. Subjects are arranged in the following categories: Climatology and Meteorology; Geodesy and Geology; Hydrology; Oceanography; Soil Science; Earth Sciences, General. Most of these translations are available through OTS for about a penny a page.

Physics of the Atmosphere

PB-165 316
Institute of Geophysics, Univ. of California, Los Angeles.
SURVEY OF DATA AND THEORETICAL ANALYSIS OF THE UPPER ATMOSPHERE. PART I: METHODS AND RESULTS OF UPPER ATMOSPHERE RESEARCH. PART II: TURBULENCE IN THE UPPER STRATOSPHERE. PART III: A TENTATIVE MODEL FOR THE GENERAL CIRCULATION IN THE STRATOSPHERE. PART IV: THE ATMOSPHERE ABOVE 100 KM. Final rept.
W. W. Kellogg and G. Schilling. Jun 50, 181p
Contract Cwb 7904
ATI-79 350
OTS $13.00

DESCRIPTORS: *Upper atmosphere, *Stratosphere, *Turbulence, *Atmospheric motion, *Atmosphere models, Sounding rockets, Meteors, Sound transmission, Convection, *Ionosphere, Electron density, Atmospheric temperature, Wind, Polar regions, Oxygen, Sky brightness, Infrared spectroscopy, Water vapor, Excitation.

Methods and results of upper-atmosphere research are given together with data on the turbulence in the upper stratosphere, information on the atmosphere above 100 km, and a proposal for a tentative model for general circulation in the stratosphere. Rocket flights, meteor studies, sound propagation, etc., were used to investigate the physical state of the upper atmosphere. Ob-

ORNL-3465
Oak Ridge National Lab., Tenn.
EVALUATION OF AN ENGINEERING DEMONSTRATION OF THE MODIFIED ZIRFLEX AND NEUFLEX PROCESSES FOR THE PREPARATION OF SOLVENT EXTRACTION FEEDS FROM UNIRRADIATED ZIRCONIUM-BASE REACTOR FUELS
F. G. Kitts. Mar 64, 64p
Contract W7405-eng-26
OTS $1.75

ORNL-3341
Oak Ridge National Lab., Tenn.
THE PRODUCTION OF LiF SINGLE CRYSTALS WITH SELECTED ISOTOPIC OF LITHIUM
C. F. Weaver, R. G. Ross, B. J. Sturm, J. E. Eorgan, and R. E. Thoma. Mar 64, 47p
Contract W7405-eng-26
OTS $1.25

NASA-TN-D-2242
Ohio State Univ., Columbus.
HIGH-SPEED PHOTOGRAPHIC INVESTIGATION OF THE FORMATION OF DETONATION WAVES IN A STOICHIOMETRIC HYDROGEN-OXYGEN MIXTURE
James A. Laughrey, Loren E. Bollinger, and Rudolph Edse. Apr 64, 50p
Grant NsG-44-60
N64-18732
OTS $1.25

DESCRIPTORS: Hydrogen, Oxygen, Mixtures, *Detonation waves, *High speed photography, Spark shadowgraph photography.

N64-18121
Rensselaer Polytechnic Inst., Troy, N. Y.
FUNDAMENTAL ATOM CHEMISTRY WITH APPLICATIONS TO THE CHEMISTRY OF THE UPPER ATMOSPHERE. Technical status rept. no. 5, 1 Jul-31 Dec 63
P. Harteck, R. R. Reeves, Jr. and E. W. Albers. 1963, 2p
Grant NsG-158-61
NASA CR-53424
OTS $1.10

DESCRIPTORS: *Upper atmosphere, *Chemistry,

AD-420 946
School of Aerospace Medicine, Brooks AFB, Tex.
PRELIMINARY STUDIES ON LIGHT-INDUCED CARBON MONOXIDE IN CLOSED ENVIRONMENTS
Syrrel S. Wilks. 9 May 63, 10p
SAM-TDR-63-65; N63-23514
OTS $1.10

DESCRIPTORS: *Carbon compounds, *Monoxides, *Closed ecological systems, *Photochemistry, *Poisonous gases, Solar radiation, Organic materials,

The paper presents experimental data concerning the effects of solar light upon certain classes of organic substances which may be components of the sealed environment of space vehicles. Many materials such as organic plastics, pigments, insulating material, etc., will when exposed to light in the presence of oxygen, liberate a number of toxic end products such as carbon monoxide, aldehydes, acids, and certain hydrocarbons. In a sealed environment these agents may, unless removed, reach levels toxic to human beings during a long sojourn in a sealed system. Therefore, along with products that may result from thermal and electrical activity (motors, generators, etc.), these products may constitute a considerable hazard in sealed environments. (Author)

Physical Chemistry

PB-165 879
Chicago Midway Labs., Univ. of Chicago, Ill.
DEPOSITION OF LEAD SULFIDE AND LEAD SELENIDE FILM FROM SOLUTION
Stanley Whitcher. Dec 54, 31p
Contract AF33(038)25913
Rept. no. CML-TN-P9; AD-53 104
OTS $3.60

DESCRIPTORS: *Lead compounds, *Sulfides, *Selenides, Thiourea, Electrodeposition, Solutions, *Films, Phototubes, Infrared detectors, Optical materials

"Lead sulfide films for mirrors and photocells are chemically prepared by mixing a soluble plumbous salt, thiourea and sodium hydroxide. Methods of preparation used in the past by other workers are discussed. The concentrations of the reactants can be varied as well as the order in which the compounds are mixed. Further investigation of these variables is reported in this work. Impurity cations such as Cu^{++} are known to enhance film deposition. This has been verified in this work by use of highly pure materials. The effect of several ions not previously studied has been investigated. A search was made for other organic sulfur compounds to use in film preparation. None were found to be as good as thiourea, and in general the quality of the films produced was related to the similarity to thiourea of the molecular structure of the organic sulfide. A method for the preparation of PbSe films is described. Several coordination complex compounds of lead and thiourea have been isolated and analyzed. These do not seem to be intermediates in the deposition mechanism, however. The mechanism which is proposed is based on the slow generation of sulfide ions by the decomposition of thiourea. Evidence is advanced to support this hypothesis." (Contractor's abstract)

PB-165 259
Defense Research Lab., Univ. of Texas, Austin.
DRL ACOUSTICAL REPORT. Final technical rept.
Otto H. Hill. 31 Jul 57, 19p
Contract DA44-009-eng-2566
Rept. no. 128; AD-202 400
OTS $1.60

DESCRIPTORS: *Lead compounds, *Azides, *Explosive materials, Detonations, Pyrolysis, Ion bombardment, Reaction kinetics, Manufacturing methods

The research program was concerned primarily with studies of the thermal decomposition and the onset of thermal initiation in alpha lead azide. In addition, minor effort was expended in studies relating to the nonaqueous manufacture of lead azide and the reproduction of an experiment by Kallman and Schrankler (Naturwissenscaften 21-23: 379, 1933) in which typical explosives were reportedly initiated by ion bombardment. (Author) (See also PB-165 258)

Aeronautical Engineering

NASA-TN-D-2251
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A PILOTED SIMULATOR STUDY OF LONGITUDINAL HANDLING QUALITIES OF SUPERSONIC TRANSPORTS IN THE LANDING MANEUVER
Richard S. Bray. Apr 64, 33p
N64-17993
OTS $0.75

DESCRIPTORS: *Supersonic planes, *Transport planes, Handling, *Landings, Simulation.

NASA-CR-28
Battelle Memorial Inst., Columbus, Ohio.
EXPLORATORY STUDIES OF MECHANICAL CYCLING FATIGUE BEHAVIOR OF MATERIALS FOR THE SUPERSONIC TRANSPORT
D. N. Gideon, C. W. Marshall, F. C. Holden, and W. S. Hyler. Apr 64, 63p
Contract NASr-100(01)
N64-18726
OTS $1.75

DESCRIPTORS: *Aircraft materials, Fatigue (Mechanics),

NASA-TN-D-2263
Boeing Co., Renton, Wash.
DYNAMIC PRESSURE AND THRUST CHARACTERISTICS OF COLD JETS DISCHARGING FROM SEVERAL EXHAUST NOZZLES DESIGNED FOR VTOL DOWNWASH SUPPRESSION
C. C. Higgins and T. W. Wainwright. Apr 64, 81p
Contract NASw-461
N64-18958
OTS $2.00

DESCRIPTORS: *Exhaust nozzles, *Jets, Pressure, Thrust, Downwash.

NASA-TN-D-2289
Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
PILOTING PERFORMANCE DURING THE BOOST OF THE X-15 AIRPLANE TO HIGH ALTITUDE
Euclid C. Holleman. Apr 64, 56p
N64-19002
OTS $1.50

DESCRIPTORS: *Rocket planes, Control.

AD-294 117
Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
REDUCTION OF REFLECTIVITY FROM TRANSPARENT MATERIALS: A MEMORANDUM IN EVALUATION OF TECHNIQUES APPLICABLE TO PLASTIC HELICOPTER CANOPIES
Norman E. Beach. Jul 62, 38p
PLASTEC rept. 9
OTS $3.60

DESCRIPTORS: Reduction, Light, Reflection, *Helicopters, *Plastics, *Aircraft canopies, Coatings, Films, Tests,

Toward the reduction of reflectivity from the plastic canopies in helicopters, the total field of effort in reduction of reflectivity from transparent materials is explored. Nine concepts are evaluated. Of these, three show sufficient promise for further study: reflection-reducing films, applied coatings, and material coverings. Six are not sufficiently applicable: change in refractive index, tinting, "piped-light," ion bombardment, "scatter" surfacing, and changes in physical form. The report includes 47 references and a bibliography on the general field, reduction of reflectivity from transparent materials. (Author)

NASA-CR-34
Serendipity Associates, Sherman Oaks, Calif.
A STUDY OF PILOT ACCEPTANCE FACTORS IN THE DEVELOPMENT OF ALL-WEATHER LANDING SYSTEMS
Harold E. Price, Ewart E. Smith, and Walter B. Gartner. Apr 64, 181p
Contract NAS2-1346
N64-18951
OTS $3.00

DESCRIPTORS: *All-weather aviation, Landings, *Landing aids,

Chemical Engineering

HW-77080
Hanford Atomic Products Operation, Richland, Wash.
PILOT PLANT DENITRATION OF PUREX WASTE WITH SUGAR
E. A. Coppinger. 29 Mar 63, 16p
Contract AT(45-1)1350
OTS $1.60

DESCRIPTORS: *Sucrose

ORNL-3481
Oak Ridge National Lab., Tenn.
SORPTION OF GASES BY VAPOR-DEPOSITED TITANIUM FILMS
R. E. Clausing. Mar 64, 50p
Contract W7405-eng-26
OTS $1.25

Civil Engineering

PB-165 340
Polytechnic Inst. of Brooklyn, N. Y.
RESEARCH LEADING TO IMPROVED STRUCTURAL DESIGN FOR GROUND ELECTRONIC APPLICATIONS.
Quarterly rept. no. 4, 1 Apr-1 Jul 53
P. R. DeCicco and L. J. Pignataro. 25 Jul 53, declassified 9 Oct 53, 178p
Contract AF39(602)216
AD-19 500
OTS $12.50

DESCRIPTORS: *Structures, Design, Mathematical analysis, Stresses, Aluminum alloys, Magnesium alloys, Loading (Mechanics), Load distribution, Wind, Pressure, Physical properties, Structural properties, Towers, Structural parts, *Antenna masts.

servational and theoretical evidence is given for the existence of convection currents and turbulence in the upper stratosphere between 50 and 80 km. General considerations of the way in which thermal energy reaches the upper atmosphere are used to estimate temperature and wind distribution at high elevations over the poles. The problem of free electron balance in the various ionospheric layers is also discussed. Results of a study on afterglow are outlined together with those of Meinel's infrared studies and excitation of water vapor in oxygen afterglow. (DDC abstract)

N64-18300
Rand Corp., Santa Monica, Calif.
ULTRAVIOLET SPECTROSCOPY OF THE UPPER ATMOSPHERE. (Part I of an Examination of the Application to Satellite Meteorology of Various Segments of the Electromagnetic Spectrum)
R. O. Hundley. Dec 63, 51p
Contract NASr-21(07)
Memo RM-3950-NASA; NASA CR-53508
OTS $5.60

DESCRIPTORS: *Upper atmosphere, *Ultraviolet spectroscopy,

NASA-CR-20
Stanford Research Inst., Menlo Park, Calif.
ATOM DENSITY MEASUREMENTS BY LUMINESCENCE OF SOLIDS
K. M. Sancier, D. J. Schott, and H. Wise. Apr 64, 82p
Contract NASr-49(09)
N64-17987
OTS $2.00

DESCRIPTORS: *Oxygen, *Nitrogen, Atoms, *Density, Luminescence.

ENGINEERING

IS-615
Ames Lab., Iowa State Univ. of Science and Tech.
LIFT COEFFICIENTS OF SPHERES MOVING IN CIRCULAR TUBES
Richard A. Hendrickson and Glenn Murphy. Nov 63, 58p
Contract W7405-eng-82
OTS $1.50

DESCRIPTORS: *Particles, Spheres, *Lift, Pipes

ANL-6796
Argonne National Lab., Ill.
THE SLUG-ANNULAR FLOW REGIME TRANSITION AT ELEVATED PRESSURE
Peter Griffith. Nov 63, 23p
Contract W31-109-eng-38
OTS $0.50

N64-18445
IIT Research Inst., Chicago, Ill.
EXPERIMENTAL DETERMINATION OF STRESS DISTRIBUTIONS IN THIN WALLED CYLINDRICAL AND SPHERICAL PRESSURE VESSELS WITH CIRCULAR NOZZLES. Phase rept. no. 1
[7 Mar 62-1 Nov 63]
W. F. Riley. 11 Dec 63, 76p
Contract NASr-65(05)
IITRI proj. M6053; NASA CR-53580
OTS $7.60

DESCRIPTORS: *Pressure vessels, *Stresses,

UCRL-11200(Vol. I)
Lawrence Radiation Lab., Univ. of California, Berkeley.
INDEX OF LRL BERKELEY MECHANICAL ENGINEERING DEPARTMENT ENGINEERING NOTES AND SPECIFICATIONS. VOLUME I.
James O. Turner. Dec 63, 422p
Contract W7405-eng-48
OTS $5.00

NASA-TN-D-2280
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
EXPERIMENTAL LOCAL HEAT-TRANSFER AND AVERAGE FRICTION DATA FOR HYDROGEN AND HELIUM FLOWING IN A TUBE AT SURFACE TEMPERATURES UP TO 5600° R
Maynard F. Taylor. Apr 64, 35p
N64-18962
OTS $1.00

DESCRIPTORS: *Heat transfer, *Friction, *Gas flow, Hydrogen, Helium.

NASA-CR-33
Measurement Analysis Corp., Los Angeles, Calif.
PROBABILITY FUNCTIONS FOR RANDOM RESPONSES: PREDICTION OF PEAKS, FATIGUE DAMAGE, AND CATASTROPHIC FAILURES
Julius S. Bendat. Apr 64, 61p
Contract NAS5-4590
N64-17990
OTS $1.50

DESCRIPTORS: *Probability, Life expectancy.

ORNL-3509
Oak Ridge National Lab., Tenn.
HIGH VACUUM FLANGE TEST OF A BREAKABLE ALUMINUM WIRE SEAL
J. D. Redman. Mar 64, 31p
Contract W7405-eng-26
OTS $0.75

N64-18442
Valley Forge Space Technology Center, Philadelphia, Pa.
OPTICAL SPACE COMMUNICATIONS SYSTEM STUDY. FINAL SYSTEMS STUDY, Vol. IV. Final rept.
3 Mar 64, 34p
Contract NASw-540
NASA CR-53581
OTS $3.60

DESCRIPTORS: *Space communication systems, *Light communication systems.

PB-165 331
Air Force Cambridge Research Labs., Bedford, Mass.
OPTIMIZATION OF ANTENNA SYSTEMS. Research rept.
Allan C. Schell. Sep 62, 20p
AFCRL-62-736; N63-13852
OTS $1.60

DESCRIPTORS: Optimization, *Antenna configurations, Performance (Engineering), Numerical analysis, Antennas

A theory for assessing errors in antenna systems and determining the optimum aperture distribution for an intended use is developed. A general error criterion is formulated, and the application of the calculus of variation and constraints intrinsic to antennas results in an integral equation that defines the conditions for the optimum antenna. The method of analysis and optimization derived from this equation is to radiative systems as the Wiener-Hopf equation is to linear time domain systems and the Euler-Lagrange equation is to fields and forces. The theory applies directly to power pattern synthesis, yielding aperture distributions without a priori specification of the farfield phase. A powerful technique for the construction of very-large-aperture antennas is developed. This is the multiplate antenna technique, a method of aperture subdivision that provides flexible antenna performance with economy of cost. The optimization theory and the multiplate antenna technique together provide a means for achieving antennas of large size and high performance that are requisite to significant advances on a wide front of current scientific and military programs. (Author)

PB-165 877
Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
CORNER REFLECTOR FOR USE WITH CIRCULARLY POLARIZED RADARS. Rept. on Research Study and Development of Techniques for Measurement of Radar Reflection Characteristics of Aircraft and Missiles
E. M. Kennaugh. 30 Jan 56, 17p
Contract AF33(616)2546
Rept. no. 601-8; AD-84 793
OTS $1.60

DESCRIPTORS: *Radar corner reflectors, *Reflectors, Dielectrics, Radar reflections, Polarization, Performance (Engineering)

A new type of corner reflector for use with circularly-polarized radars is described. In contrast to conventional triple-bounce corner reflectors, the new reflector returns a circularly polarized incident wave without reversal of sense of rotation. The polarization properties of this reflector are essentially independent of frequency. The new type of reflector consists of a triangular corner reflector filled with dielectric material. One metallic wall of the corner reflector has been removed, so that total internal reflection may occur at this interface. The dielectric filling may be any low-loss material with dielectric constant above 2.3, such as polystyrene. The principle of operation of the dielectric corner reflector is discussed, and the response is calculated for a dielectric constant of 2.6. The response of this reflector to circularly polarized radars is within 1.5 decibels of the response of a conventional triangular corner reflector of the same size to linearly polarized radars. The region of aspects for which comparison is made includes all aspects within 20^{0} of the symmetry axis of either corner. (Author)

PB-181 655-1
Bureau of Naval Weapons, Washington, D. C.
CAVITY FREQUENCY METERS 2.60 THROUGH 26.50 GC (KMC). Technical manual, BuWeps-BuShips Calibration Program. 15 Jun 63, changed 1 Mar 64. 6p
Instrument Calibration Procedure GF-04 rev.
OTS $0.50

DESCRIPTORS: Instruction manuals, *Frequency meters, Calibration, Test equipment (Electronics).

This procedure describes the calibration of waveguide-type cavity frequency meters in the frequency range of 2.60 to 26.50 Gc. Instructions are given for the calibration of meters in frequency ranges of 2.60 to 12.40 Gc, 12.40 to 18.00 Gc, and 18.00 to 26.50 Gc.

PB-181 674
Bureau of Naval Weapons, Washington, D. C.
VSWR MODIFIED REFLECTOMETER TECHNIQUE. Technical manual, Navy Calibration Program
S. Evendorff. 15 Jul 63
Standards Lab. Instrument Calibration Technique JV-01
OTS $1.00

DESCRIPTORS: *Reflectometers, Measurement, X band, Reflection, Microwaves, *Waveguides, Calibration, *Standing wave ratios,

This document covers the operation of the modified reflectometer system for measuring the VSWR or reflection coefficient of X-band (WR-90) waveguide components. The system is normally used to calibrate standard reflections or mismatches with a reflection coefficient of 0.025 or greater (VSWR > 1.05), to an estimated accuracy between $\pm 1.5\%$ and $\pm 2\%$ of the reflection coefficient. Although the procedure described herein applies specifically to the WR-90 (8.2-12.4 Gc) waveguide size, it can be adapted to other frequency bands when the required waveguide components are available.

AD-279 444
Crocker, Burbank and Co., Assn., Fitchburg, Mass.
PRODUCTION ENGINEERING MEASURE ON CAPACITOR PAPER. Quarterly rept. no. 2, 23 Sep-23 Dec 61
C. E. Cashman and J. D. Stacy. [1962] 26p
Contract DA36-039-sc-85970
OTS $2.60

DESCRIPTORS: *Paper capacitors, Capacitors, Paper, Chemical analysis, Spectrophotometers, PH, Chlorides, Metals, Quantitative analysis, Tests, Life expectancy, Impregnation, Manufacturing methods.

Qualitative determinations of metallic elements present in three regular production lots of .00025" DC capacitor tissue selected for evaluation were made by flame photometric methods. A technique for the quantitative determination of metallic elements present in capacitor paper by the flame spectrophotometric process was developed. Analytical procedures for determination of pH and soluble chlorides in capacitor paper were employed in the measurement of these factors. Three preliminary trial batches of capacitors designed for CP04A3KE105K of U. S. Military Specification MIL-C-25C were assembled, impregnated, and operated on life test sufficiently to develop and evaluate a satisfactory technique for fabrication of said units. (Author) (See also AD-296 004)

Individual support members of various cross-sectional shapes were studied and compared with respect to weight, wind load, and allowable direct and combined loading. Seven load-length zones were established to allow the selection and computation of significant characteristics for several different shapes and sizes of members within each zone. Evaluation of the members was made by comparing the computed characteristics of each with those of the circular tubular member. The relative advantage of one member over another was determined by its base ratio value, which is the ratio of the characteristic under study for a given member to the value of the characteristic for the circular section. The computed data which are presented in tables and curves indicated that tubular members are generally superior to the open type, rolled members. Tubular members offered comparatively high strength and low weight, and received lower wind loads. These advantages were accompanied by higher shop fabrication cost.

PB-165 341
Polytechnic Inst. of Brooklyn, N. Y.
RESEARCH LEADING TO IMPROVED STRUCTURAL DESIGNS FOR GROUND ELECTRONIC APPLICATIONS
Quarterly technical rept. no. 5, 1 Jul-1 Oct 53
E. J. Squire, P. R. DeCicco, and L. J. Pignataro.
18 Nov 53, 57p
Contract AF30(602)216
AD-25 088
OTS $5.60

DESCRIPTORS: *Structures, Design, Mathematical analysis, Stresses, Towers, Loading (Mechanics), Load distribution, Wind, Pressure, Geometric forms, Structural parts, *Antenna masts,

Study showed that the 90° Y-section compares favorably with the circular tube section on a weight basis. Throughout the load-length zones considered, the weight of the 90° Y-section varied from 4% lighter to 20% heavier than that of the circular tubes. The variation in wind load/ft of member for the 90° Y-section ranged from about 2 to 3.8 times the wind load on circular tubes. Data were obtained which show that the 90° Y-section compares more favorably with the angle sections than with the circular tubes. The maximum wind load is 42% greater than that for the angle section. Although the angle sections are simple to connect, the eccentricity (compared to that of the 90° Y-section) is rather large. The 60° Y-section does not compare as favorably as the 90° Y-section with the circular tube or angle. Since a decrease in the angle between the connector legs serves to decrease the effective radius of gyration and to increase the projected area, the 60° Y-section will be heavier and will receive a greater wind load than the 90° Y-section. (See also PB-165 340)

Electrical and Electronic Engineering

AD-267 487
Airborne Instruments Lab., Inc., Deer Park, N. Y.
DEVELOPMENT OF TUNABLE C-BAND REACTANCE AMPLIFIERS. Quarterly rept. no. 2, 1 Jun-31 Aug 61
J. Kliphuis and J. J. Whelehan. Sep 61, 25p
Contract DA36-039-sc-87405
AIL rept. no. 1124-I-2
OTS $2.60

DESCRIPTORS: C band, *Microwave amplifiers, Amplifiers, Tuning devices, Design, Broadband, Phase shifters, Diodes, Voltage, Band-pass filters, *Tuned amplifiers.

The amplitide and phase stability of tunable C-band reactance amplifier as a function of pump power and frequency is discussed. The effect of the circulator bandwidth on the stability of the amplifier is analyzed. The importance of an efficient broad-band pump circuit is emphasized, and the tunability of the amplifier is computed and shown in graphical form. The availability of suitable varactor diodes is also discussed. (Author)

AD-291 659
Airborne Instruments Lab., Inc., Deer Park, N. Y.
DEVELOPMENT OF TUNABLE C-BAND REACTANCE AMPLIFIERS. Final rept., 1 Dec 61-31 Jul 62
J. J. Whelehan, I. Haber, and K. Siegel. Aug 62, 89p
Contract DA36-039-sc-87405
AIL rept. no. 1124-1-4
OTS $8.10

DESCRIPTORS: *Tuned amplifiers, *Parametric amplifiers, *Radar tracking, *Search radar, Diodes, Microwave amplifiers, C band, X band, Ultra high frequency, Test equipment (Electronics) Test methods,

Three different types of tuning procedures were evaluated for the development of a three-channel C-band reactance amplifier. The tuning procedure used (tunable idler by one knob bias control) was the most advantageous for a three-channel AN/FPS-16 monopulse radar. A UHF reactance amplifier system was mounted on the focus of an antenna. The amplifier was tunable with a gain of more than 20 db from 910 to 980 Mc with a bandwidth greater than 20 Mc and a noise figure of less than 2 bd. The system was enclosed in a temperature-controlled box for stability. Diodes were evaluated for nonlinearity for their use with amplifiers with a large gain-bandwidth product. A test procedure is also given to determine the important parameters of a diode. A theoretical analysis of a three frequency reactance amplifier from an elastance viewpoint is treated. The gain-bandwidth product and noise figure are derived. (Author) (See also AD-272 887)

PB-165 330
Air Force Cambridge Research Labs., Bedford, Mass.
BROADSIDE AND SCANNED BEAMS FROM ARRAYS OF VARIABLE SPACED ELEMENTS PROXIMITY COUPLED TO A TWO-WIRE LINE. Research note
G. R. Forbes, C. J. Sletten, and J. L. Poirier.
Sep 62, 26p
AFCRL-62-727; N63-13989
OTS $2.60

DESCRIPTORS: *Antenna configurations, *Antenna radiation patterns, *Dipole antennas, Couplings Transmission lines, *Scanning, Satellites (Artificial), Tracking, Antennas, *Coupled antennas.

Scanning $\pm 50^{\circ}$ from broadside, a new type of "stretch" antenna array consists of dipole elements proximity-coupled to an open two-wire line. The dipoles are supported at a fixed height above the transmission line and the spacing changed from $\lambda/2$ to λ. (Author)

PB-165 312
Hughes Aircraft Co., Culver City, Calif.
DESIGN OF LINE SOURCES FOR NARROW BEAM-WIDTH AND LOW SIDE LOBES
Thomas T. Taylor. 31 Jul 63, 36p
Contract AF19(604)262-F8
Technical memo. no. 316
OTS $3.60

DESCRIPTORS: *Microwave equipment, Antennas, Antenna configurations, Design, *Transmission lines, *Antenna radiation patterns, Bandwidth, Antenna lobes, Optimization, Functions, Transformations (Mathematics)

The problem of designing a highly directive continuous line source with an optimum compromise between beam-width and side lobe level is considered. The ideal space factor is shown to be $\cos \pi\sqrt{u^2 - A^2}$ where $u = (2a/\lambda) \cos \theta$, a is the half-aperture of the source and cosh A is the side lobe ratio. Because of definite theoretical limitations, this pattern cannot be obtained from a physically realizable antenna. Nevertheless the ideal characteristics of this pattern may be approached arbitrarily closely. Design procedures for doing this are given in detail. (Author)

PB-165 310
Hughes Aircraft Co. [Culver City, Calif.]
DESIGN TECHNIQUES FOR WAVEGUIDE SLOT ARRAYS
Robert J. Stegen. Dec 51, 30p
Contract AF19(122)454
Technical memo. no. 264
OTS $2.60

DESCRIPTORS: *Microwave equipment, Waveguides, *Waveguide slots, Design, Resonance, Excitation, Polynomials,

Linear arrays of slots may be classified into two groups, the resonantly spaced array and the non-resonantly spaced array. Each of these types requires a different design procedure. Because of the design, the bandwidth of a resonantly spaced array is small compared with the bandwidth of a non-resonantly spaced array. Both design procedures are presented with simplifying assumptions indicated. A method is presented for determining the excitation coefficients of an array to produce a specified radiation pattern. An example is given in which the radiation pattern is a Tchebyscheff polynomial. Results of measurements on both resonantly and non-resonantly spaced arrays are given. (Author)

PB-165 313
Hughes Aircraft Co., Culver City, Calif.
DOLPH ARRAYS OF MANY ELEMENTS
Thomas T. Taylor. 18 Aug 53, 10p
Contract AF19(604)262-F-12
Technical memo. no. 320
OTS $1.10

DESCRIPTORS: *Microwave equipment, Antennas, *Antenna configurations, *Transmission lines, Antenna radiation patterns, Antenna lobes, Excitation, Polynomials, Transformations (Mathematics)

G. J. van der Maas' expression for the limiting envelope of the excitation coefficients of a Dolph array as the number of elements is indefinitely increased is derived from the "ideal space factor' function, $\cos \pi\sqrt{u^2 - A^2}$. The envelope is:

$$g_e(p, A) = \frac{\pi A^2}{4} \cdot \frac{2J_1\left[iA\sqrt{\pi^2 - p^2}\right]}{iA\sqrt{\pi^2 - p^2}}$$

where $\cosh \pi A$ is the side lobe ratio, and p is a variable running from $-\pi$ to π. An envelope for a 40 db side lobe ratio is calculated and compared with the actual Dolph coefficients in a 24 element 40 db array. (Author)

PB-165 315
Hughes Aircraft Co., Culver City, Calif.
A FIVE-ELEMENT SUPERGAIN DIPOLE ARRAY
R. S. Elliott. 31 Oct 54, 29p
Contract AF19(604)262
Technical memo. no. 380
OTS $2.60

DESCRIPTORS: *Microwave equipment, *Antennas, Antenna configurations, *Dipole antennas, Gain, *Transmission lines, Dielectrics, Antenna radiation patterns, Antenna lobes, Bandwidth.

The design and testing of a five-element dipole array is described. The array was supergained by feeding it with a dielectric-loaded transmission line. This resulted in a thirty-eight percent contraction of the length of the array. The price paid was efficiency if the dipoles were resistance-loaded, bandwidth if they were not. Good agreement between theory and experiment was achieved. (Author)

PB-165 878
Hughes Aircraft Co., Culver City, Calif.
REMOTELY ACTIVATED ZINC SILVER PEROXIDE RESERVE PRIMARY BATTERY. Rept. on Proj. MX-904
Eugene E. Smith. 30 Aug 54, 45p
Contracts AF33(038)28634 and AF33(038)15826
Technical memo. no. 352; AD-47 115
OTS $4.60

DESCRIPTORS: *Guided missile batteries, *Primary cells, *Storage batteries, Electrolytes, Design, *Batteries and components, Electrical equipment, Zinc compounds, Silver, Peroxides, Battery separators

Activity was directed toward the development of a remotely activated reserve primary battery for use in applications where a considerable amount of power is required for one period of relatively short duration. In the battery developed and in those procured from 2 subcontractors, the electrolyte (KOH) is stored in a compartment separate from the one containing the plate and separator materials of the individual cells. The 2 compartments are so arranged that the electrolyte can be readily injected into the compartment containing the active plate and separator materials, thereby forming a battery which is charged and ready for use. All of the designs rely on a pressure differential to effect transmission of the electrolyte to the battery cell compartment. However, the 3 designs differ in the method of obtaining this pressure differential. Because these batteries do not require charging, the necessity of servicing during storage is obviated, even though the battery may be stored as long as 2 yr. The use of a reserve primary battery is expected to result in virtual elimination of all field handling and tactical problems associated with batteries. (DDC abstract)

AD-281 389
Crocker, Burbank and Co., Assn., Fitchburg, Mass.
PRODUCTION ENGINEERING MEASURE ON CAPACITOR PAPER. Quarterly rept. no. 3, 23 Dec 61-23 Mar 62
C. E. Cashman and J. D. Stacy. [1962] 12p
Contract DA36-039-sc-85970
OTS $1.60

DESCRIPTORS: *Paper capacitors, Capacitors, Paper, Chemical analysis, Spectrophotometers, PH, Chlorides, Metals, Quantitative analysis, Tests, Life expectancy.

Quantitative determinations were made of eight metallic elements present in three lots of .00025" DC capacitor tissue being evaluated. The determinations, in terms of parts per million of each element present in the paper, were made by the flame photometric technique. The paper lots are designated for purposes of identification as USA-1, USA-2, and USA-3. The chloride content and pH of paper extract of the above three lots of capacitor tissue were also measured. Operating life tests (1000 hours) of the first paper evaluation batch of capacitors (Type CP04A3KE105K), comprising paper from USA-1, USA-2, and USA-3 were made per U. S. Military Specification MIL-C-25C and the results are reported. All three of these paper lots met the specified military life test requirement (250 hours). There appears to be a possible correlation between (1) The calcium content of the paper and the military capacitor life test performance thereof, and (2) The pH of the paper extract and the military capacitor life test performance thereof, (Author) (See also AD-279 444)

PB-165 337
Eagle-Picher, Co., Joplin, Mo.
RESEARCH INVESTIGATIONS LEADING TO THE DEVELOPMENT AND EVALUATION OF A CADMIUM-SILVER OXIDE BATTERY HAVING AN HERMETICALLY SEALED CONSTRUCTION. Quarterly progress rept. no. 1, 1 Jul-30 Sep 60
J. K. Wilson. [1961] 25p
Contract DA 36-039-sc-85370
AD-249 625
OTS $2.60

DESCRIPTORS: *Wet cells, Design, Tests, *Oxides, *Cadmium compounds, Silver compounds, Electrolytes, Battery separators.

Exploratory work and a number of general tests were performed in order to obtain data that would lead to the development of a rechargeable, cadmium - silver oxide cell having an hermetically sealed construction. Various types of open and closed separators as well as a combination of the two were evaluated in order that both long cycle life as well as the capability of being over-charged could be designed into the cells. Test results indicate that a combination of separators including cellophane must be used in order to promote long cycle life. A preliminary study of the effects of electrolyte volume and concentration as well as positive-to-negative capacity ratio was made to determine the effects of these variables on cycle life and the capability of being overcharged. The data indicate that a very fine balance of electrolyte-to-core weight, as well as positive-to-negative capacity, is necessary in order to obtain optimum cell characteristics. (Author)

NASA-TN-D-2269
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
WIDE RANGE PHASE DETECTOR
George B. Robinson. Apr 64, 26p
N64-18082
OTS $0.75

DESCRIPTORS: *Phase detectors.

PB-165 311
Hughes Aircraft Co. [Culver City, Calif.]
DESIGN APPLICATIONS OF EDGE SLOTS. PART I. SIMPLE EDGE SLOTS. PART II. DUMBBELL EDGE SLOTS
Louis A. Kurtz and Eric Strumwasser. Jan 52, 25p
Contract AF19(122)454
Technical memo. no. 266
OTS $2.60

DESCRIPTORS: *Microwave equipment, Waveguides, X band, *Waveguide slots, Design, Resonance, Conductivity,

An experimental investigation of edge slots in X-band waveguide was made. The results for simple edge slot coupling between waveguides are presented in Part I by means of curves of resonant conductance and depth of cut as a function of frequency for inclinations of 20^{o} and 30^{o}. A study of the effects of wall thickness variation on slot characteristics was made. An example of a linear array of slot-fed waveguide radiators is given. The results of measurements on dumbbell edge slots radiating into free space are presented in Part II by means of curves of resonant conductance and resonant diameters as a function of frequency for various angles of inclination. A comparison with Stevenson's theoretical expression for simple edge slots is made. Examples of dumbbell slot application in linear array design are given. (Author)

PB-165 314
Hughes Aircraft Co., Culver City, Calif.
DESIGN OF CIRCULAR APERTURES FOR NARROW BEAMWIDTH AND LOW SIDELOBES
Thomas T. Taylor. 30 Aug 54, 32p
Contract AF19(604)262
Technical memo. no. 372
OTS $3.60

DESCRIPTORS: *Microwave equipment, Antennas, *Antenna configurations, Design, *Transmission lines, Antenna radiation patterns, Narrow band, Antenna lobes, Synthesis, Statistical functions, Transformations (Mathematics)

Methods for designing circular apertues are described. These methods are an extension of the technique for designing line sources described in Technical Memorandum No. 316. The same ideal space factor function $\cos \pi\sqrt{u^2 - A^2}$ is used in both cases. For the circular aperture $u = (2a/\lambda \sin \theta)$, a is the radius of the aperture and $\cosh \pi A$ is the sidelobe ratio. The procedures for the line source and for the present case are strikingly similar in a general way, but differ considerably in details. (Author) (See also PB-165 312)

DESCRIPTORS: *Magnetic recording systems, *Digital systems, Control systems, Band-pass filters, Amplifiers, Interrupters, Gain, Multiplex, Analog to digital converters, Magnetic tape, Modules (Electronics), Pulse generators, Noist (Radio), Errors, Display systems.

A digital recording system for field use is discussed. The system has been in use for over three years and has presented little or no operational difficulties. Five basic sections make up the recording system in the following order: analog, sampling and quantizing, magnetic tape assembly, visual monitor, and system control The analog section consists of eight bandpass filters which feed the chopper stabilized dc amplifiers capable of 66 db maximum gain. The sampling and-quantizing section consists of an 8 channel multiplexer which receives the signals from the eight isolation transformers and samples them either in parallel or sequentially. At the time of sampling, the instantaneous voltage values are held on eight sample-and-hold circuits for sequential processing by an analog-to-digital converter. The converter encodes the value held on each circuit into binary digits consisting of ten bits and a plus or minus sign (11 bit word). This will give the analog sample a quantized value of one part in 1024, plus and minus, representing about 0.1 percent resolution. The magnetic tape assembly section consists of a 16-channel dual head, digital recorder which accepts the binary output from the converter. The visual monitor section of the system makes use of the dual head recorder to visually check the information written on the tape. (Author)

PB-165 342
Navy Electronics Lab., San Diego, Calif.
DESIGN OF RECEIVER ANTENNA SYSTEMS, CONSIDERING NOISE LIMITATIONS
J. H. Raleigh, 4 Apr 50, declassified, 22p
Rept. no. 166
OTS $2.60

DESCRIPTORS: *Antenna configurations, Ships, Signal-to-noise ratio, Design, Performance (Engineering), Tests,

The object of the work was to find the most feasible receiver antenna system for naval vessels, considering noise limitations. For this purpose receiver antenna systems in general were studied, and three types of receiving systems were evaluated and compared: (1) A receiving system in which one antenna is connected to one receiver; (2) A receiving system in which one antenna is connected to several receivers; and (3) As (2), except that all transmission lines are terminated by antenna multicouplers (active networks with tubes) the outputs of which in turn feed a number of receivers. Consideration was given to fundamental factors such as receiver noise, atmospheric noise, and input impedances of the antenna, receiver, and transmission line. (Author)

PB-165 344
Navy Electronics Lab., San Diego, Calif.
EVALUATION OF EXTERNAL BATTERY POWER SUPPLY BY BATHYSCAPH TRIESTE. Evaluation rept.
L. A. Shumaker. 18 Aug 61, 19p
Rept. no. 1063.
OTS $1.60

DESCRIPTORS: Lead, Acids, *Storage batteries, Power supplies, *Batteries and components, *Underwater equipment, Oceanographic vessels, Effectiveness, Tests,

Tests were conducted using lead-acid batteries as a power supply on the bathyscaph Trieste. Methods were developed for encapsulating batteries, relaying power, insulating batteries, and transmitting water pressure to prevent casings from collapsing. Lead-acid storage batteries were found to provide an effective and practical power source under pressures up to 16,000 psi and temperatures down to 35°F. They are cheaper than silver-zinc cells and may be mounted externally to save cabin space. Report recommends them on Trieste and recommends extending investigations to include other types of "wet" batteries for similar uses. Charts and illustrations provide information about battery performance, installation, and testing procedure (Author)

OTS SB-523
Office of Technical Services, Dept. of Commerce, Washington, D. C.
BATTERIES. Aug 63, 26p
OTS Selective Bibliography SB-523
OTS $0.10

DESCRIPTORS: *Batteries and components, *Water-activated batteries, *Radioactive batteries, *Alkaline cells, *Primary cells, *Storage batteries, *Battery chargers, *Bibliographies.

Lists 607 domestic and foreign references on batteries added to the OTS collection during the period 1945 through August 1963. Reports are listed in the following categories: Ammonia Activated Batteries; Water Activated Batteries; Nuclear Batteries; Primary Batteries; Storage Batteries; Batteries, General; and Battery Chargers. For related bibliographies see SB-477, Rev., Fuel Cells; SB-418 and Suppl. 1, Solar Energy; SB-484, Unconventional Power Sources.

AD-402 415
Ohio State Univ. Research Foundation, Columbus.
THE USE OF THE JUNCTION DIODE AS A LOW TEMPERATURE THERMOMETER. Rept. on Study of Electromagnetic Radiation
Glenn G. Shephard. 31 Jan 63, 22p
Contract AF33(616)7081
Rept. no. 1083-22; N63-18324
OTS $2.60

DESCRIPTORS: *Thermometers, *Transistors, *Diodes (Semiconductor), Low-temperature research, Electric bridges

The nonlinear resistance-temperature (at low temperature, in particular) characteristic of a semiconductor junction can be combined with the nonlinear effect of a d-c bridge to produce a linear variation of temperature with a particular resistance. This memorandum details the manner in which the bridge produces a linear variation of temperature with ΔR according to the expression $\Delta R = A + BT$. This temperature-monitoring device was used successfully over the range from 273°K to 77°K. Recent studies have shown the validity of extending this lower limit down to liquid-helium temperature (≈ 4°K). (Author)

PB-165 309
Hughes Aircraft Co. [Culver City, Calif.]
WAVEGUIDE SLOT MEASUREMENT TECHNIQUES
Robert J. Stegen. Dec 51, 15p
Contract AF19(122)454
Technical memo. no. 262
OTS $1.60

DESCRIPTORS: *Microwave equipment, Waveguides, *Waveguide slots, Electrical impedance, Measurement

There are two different techniques which lend themselves to measuring slot impedances or admittances. In the first method, the impedance is determined from the voltage standing wave ratio and the node-to-slot distance as measured by a traveling probe in a slotted line. In the second method, the impedance relative to a previously measured reference slot is calculated from the measured radiation pattern of the reference slot and an unknown slot in one section of waveguide. The radiation pattern technique has the advantages, (1) that it offers a method of more accurately measuring slots which couple very slightly to the waveguide, and (2) that it gives correlation between the phase of the radiated field and the phase of the impedance. (Author)

N64-18304
Institute for Direct Energy Conversion, Univ. of Pennsylvania, Philadelphia.
STATUS REPORT AS OF JANUARY, 1964
28 Feb 64, 106p
Grant NsG-316
NASA CR-53557
OTS $9.10

DESCRIPTORS: *Energy conversion.

N64-18438
ITT Electron Tube Div., ITT Corp., Easton, Pa.
DEVELOPMENT OF ELECTRONICALLY-TUNABLE CONVERTERS IN THE MILLIMETER-WAVE RANGE.
Bimonthly rept. no. 4, 16 Jan-16 Mar 64
R. W. Wilmarth and R. J. Kenyon. [1964] 7p
Contract NASw-790
NASA CR-53585
OTS $1.10

DESCRIPTORS: *Tuned circuits, Millimeter waves.

N64-18425
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A MICROELECTRONIC ANALOG-TO-DIGITAL CONVERTER AND SYNC GENERATOR
J. Denton Allen. 6 Feb 64, 25p
Contract NAS7-100
Technical rept. no. 32-569; NASA CR-53561
OTS $2.60

DESCRIPTORS: *Analog-to-digital converters, *Generators, *Microminiaturization (Electronics)

NASA-CR-32
Measurement Analysis Corp., Los Angeles, Calif.
FREQUENCY RESPONSE FUNCTIONS AND COHERENCE FUNCTIONS FOR MULTIPLE INPUT LINEAR SYSTEMS
Loren D. Enochson. Apr 64, 80p
Contract NAS5-4590
N64-17989
OTS $2.00

DESCRIPTORS: *Linear systems, *Input-output devices, Frequency, Functions.

AD-290 479
Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF LOW NOISE TRAVELING-WAVE TUBES. PHASE III: ENVIRONMENTALIZATION.
Monthly status letter rept. no. 5, 9 Jun-9 July 62
A. C. Ashley. 9 Jul 62, 13p
Contract NObsr-81227
OTS $1.10

DESCRIPTORS: *Microwave equipment, *Traveling wave tubes, Noise (Radio), Corrosion, Environmental tests, Salt spray tests, Humidity.

The twt package was subjected to humidity and salt spray tests. Preliminary results of tests comparing various packages are presented. (Author) (See also AD-400 952)

PB-165 320
Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE PRECISION MEASUREMENT OF THE EQUIVALENT CIRCUIT PARAMETERS OF DISSIPATIVE MICROWAVE STRUCTURES
L. B. Felsen and A. A. Oliner. Mar 53, 53p
Contract AF19(122)3
Rept. no. R-282-52; PIB-221; AD-14 055
OTS $5.60

DESCRIPTORS: *Microwave networks, *Waveguides, Circuits, Measurement, Mathematical analysis

Measurement procedures based on A. Weissfloch's separation of a dissipative network into lossy and lossless portions (Elek. Nachr. Tech. 19, 1942) are presented for the precise determination of the equivalent circuit parameters of dissipative 4-terminal structures. The methods are developed around distance-invariant equivalent networks which possess a number of desirable features and permit a simplification in the necessary calculations. Semiprecision and precision procedures are treated, and sample calculations are presented. (Author)

AD-430 890
Naval Research Lab., Washington, D. C.
A MAGNETIC DIGITAL RECORDING SYSTEM FOR FIELD USE. Interim rept.
C. McCoy, Jr. and H. L. Peterson. 15 Nov 63, 10p
NRL-6016
OTS $0.50

encountered in manufacturing and handling are reported and the necessary precautions outlined. Some of the more frequently occurring defects, like target blemishes and crazing, were investigated. As a result, a satisfactory contol over target quality was achieved including the processing of complete tubes. (Author) (See also AD-407 904)

Ordnance, Missiles, and Satellite Vehicles

NASA-TN-D-2237
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THEORETICAL STUDY OF ORBITAL ELEMENT CONTROL WITH POTENTIAL APPLICATIONS TO MANNED SPACE MISSIONS
James C. Howard. Apr 64, 59p
N64-18957
OTS $1.50

DESCRIPTORS: Manned spacecraft, Control, Guidance, *Space navigation.

PB-165 873
Army Missile Command, Redstone Arsenal, Huntsville, Ala.
STRUCTURAL RESPONSE TO MISSILE THRUST. [PROCEEDINGS OF THE ARMY CONFERENCE ON DYNAMIC BEHAVIOR OF MATERIALS AND STRUCTURES, PAGES 506-515, HELD AT SPRINGFIELD ARMORY, MASSACHUSETTS, SEPTEMBER 26-28, 1962]
J. N. Crenshaw. [1962] 10p
N63-16626
OTS $1.10

DESCRIPTORS: *Guided missiles, Structural properties, Thrust, Shock (Mechanics), Loading (Mechanics), Mathematical analysis, Symposia,

A method for the evaluation of a so-called Dynamic Load Factor for use in the design of missile structures is presented. In the general case one of the major shocks that the missile experiences is a result of the increase of the thrust vector as the motor is ignited. Initially, investigation develops a mathematical model for a thrust time history of a missile motor. Comparison of this theoretical model with measured firing test results is shown. Application of thrust as a forcing function on a single-mass spring model is accomplished. Using the ratio of a natural frequency of the spring mass to the frequency of the forcing function as a parameter, the response of the vehicle in terms of a multiple of the instantaneously impressed force is defined. (Author)

NASA-TN-D-2189
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
DESCRIPTION OF VEHICLE SYSTEM AND FLIGHT TESTS OF NINE TRAILBLAZER I REENTRY PHYSICS RESEARCH VEHICLES
William N. Gardner, Clarence A. Brown, Jr., Allen B. Henning, W. Ray Hook, and Reginald R. Lundstrom. Apr 64, 92p
N64-18730
OTS $2.25

DESCRIPTORS: *Re-entry vehicles, Flight testings.

NASA-TN-D-2198
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECTS OF MAGNETICALLY INDUCED EDDY-CURRENT TORQUES ON SPIN MOTIONS OF AN EARTH SATELLITE
G. Louis Smith. Apr 64, 29p
N64-18956
OTS $0.75

DESCRIPTORS: *Satellites (Artificial), *Torque,

NASA-TN-D-2268
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PRELIMINARY ANALYSIS OF A SIMULATED METEOR REENTRY AT 9.8 KILOMETERS PER SECOND
W. O. Jewell and A. R. Wineman. Apr 64, 25p
N64-19060
OTS $0.75

DESCRIPTORS: *Meteors, Simulation; *Re-entry vehicles.

NASA-TN-D-2072
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
LOW-THRUST ORBIT RAISING IN CONTINUOUS SUNLIGHT
Dennis W. Brown. Apr 64, 37p
N64-18078
OTS $1.00

DESCRIPTORS: *Orbital trajectories, Optimization.

PB-165 872
[Little (Arthur D.) Inc., Cambridge, Mass.]
OPTICAL PROPERTIES OF SATELLITE SURFACE MATERIALS. PART I: EFFECT OF SATELLITE ENVIRONMENT ON THE EMISSIVITY OF MATERIALS. PART II: SPECTRAL EMITTANCE OF POLISHED STAINLESS STEEL, ALUMINUM, AND MAGNESIUM AT 50°C IN THE 0.25-28.0 WAVELENGTH REGION. Final technical summary rept.
I. Simon, Eleanor Chaffee, and Henry H. Blau, Jr.
Sep 61, 71p
Contract DA19-020-ORD-4857
Rept. no. C-62081; NP-11675
OTS $7.60

DESCRIPTORS: *Satellites (Artificial), Surface area, Materials, Metals, Semiconductors, Inorganic compounds, Optical properties, Space environmental conditions, Tests, Stainless steel, Aluminum, Magnesiu Magnesium.

The impact of any or all of the types of particles or radiation found in space can alter the optical properties of various materials when applied in a sufficient dose. The effects of radiation and impact damage are examined for three groups of materials, namely, metals, semiconductors and inorganic solids. Presented also are the results of an experimental study of the spectral emittance of polished stainless steel, aluminum, and magnesium in the wavelength range 0.25-27.0 microns, at 50°C. This work was undertaken for the purpose of determining the changes in emission properties accompanying varying degrees of surface roughness of the specific samples under study. (Author)

AD-425 081
RCA Labs. [Div.] Radio Corp. of America, Princeton, N. J.
BASIC RESEARCH IN THERMIONIC CONVERTERS.
Final rept., 1 May 62-31 Oct 63
James R. Fendley, Jr. and Karl G. Hernqvist. [1963] 18p
Contract Nonr 3826(00)FBM
OTS $0.50

DESCRIPTORS: *Energy conversion, *Thermionic converters, Electric arcs, *Gas discharges, *Cesium, Vapors, Additives, Helium group gases, *Helium, *Argon, Electrical properties.

Apparatus and measurement techniques for studies of the effects of adding noble gases to operating cesium vapor thermionic converters are first described. Experimental results on the effect of adding helium and argon at pressures up to several tens of torr are given. The thermionic converter operating in the low-temperature arc mode is relatively insensitive to noble gas additives. The observed effects of gas dosing are small and can be summarized as follows: The discharge becomes more stable and the glow region in the interelectrode space becomes more uniformly distributed. The electron transport properties of the diode are adversely affected at high current densities and large electrode spacings. The output voltage at low current levels increases upon introduction of noble gases. Theoretical interpretations of these results are described. (Author) (See also AD-410 984)

NASA-CR-44
Sperry Microwave Electronics Co., Clearwater, Fla.
PYROELECTRIC DETECTION TECHNIQUES AND MATERIALS
Apr 64, 44p
Contract NASw-711
N64-18727
OTS $1.25

DESCRIPTORS: *Detectors, Materials, Barium compounds, Titanates.

PB-165 343
Sprague Electric Co., North Adams, Mass.
DEVELOPMENT OF STABLE CERAMIC CAPACITORS, HI-K. Quarterly progress rept. no. 4, 15 Sep-15 Dec 60
T. Prokopowicz. [1960] 44p
Contract DA36-039-sc-78318
AD-251 125
OTS $4.60

DESCRIPTORS: *Ceramic capacitors, Capacitors, *Barium compounds, *Titanates, Additives, Ceramic materials, *Sodium compounds, Oxides, *Niobates, Temperature, Dielectric properties

$BaTiO_3$ - $NaNbO_3$ - $NbO_{2.5}$ fine-grained ceramics are discussed with regard to solid solution formation. The effects of CuO, $LaAlO_3$, and $LaCrO_3$ additions to the base material are reported. The incorporation of Fe^{3+}, Mg^{2+}, and Li^{+} in $BaTiO_3$ - $Ba_{0.5}NbO_3$ ceramics is discussed and the effect of these ions on temperature stability of capacitance is presented. A study of the effect of grain size on the dielectric constant of pure $BaTiO_3$ is reported. Finally, electrical properties of several Monolythic capacitors are given. (Author) (See also PB-162 334)

AD-417 086
Watkin-Johnson Co., Palo Alto, Calif.
WIDE BAND ELECTRONICALLY TUNABLE FILTERS.
Technical note no. 2, 1 Oct 62-31 Jan 63
A. W. Shaw. Feb 63, 20p
Contract AF30(602)2625
Rept. no. W-J63 609R10; RADC-TDR-63-137
OTS $1.60

DESCRIPTORS: *Waveguide filters, Broadband, *Band pass filters, Coaxial filters, Yttrium, Iron, Garnet, X band, K band, S band, Coaxial cables, Distortion, Dielectrics

Methods of improving the passband distortion in X-band and Ku-band YIG filters are outlined. Tests at both X-band and Ku-band are described. A wedge loaded, coaxial line for use in non-reciprocal YIG filters at L-, S-, and C-band is discussed and results on directivity at S-band are given. Work on a band reject filter at X-band is presented along with plans for extension of the same technique to L-, S-, and C-band. (Author) (See also AD-297 166)

NASA-CR-25
Westinghouse Electric Corp., Baltimore, Md.
ADDENDUM REPORT ON ELECTROMAGNETIC ATTITUDE CONTROL SYSTEM STUDY
Mar 64, 159p
Contract NAS5-1728
N64-18457
OTS $3.00

DESCRIPTORS: *Attitude control systems, *Electromagnetic properties.

NASA-CR-24
Westinghouse Electric Corp., Baltimore, Md.
ELECTROMAGNETIC ATTITUDE CONTROL SYSTEM STUDY
Mar 64, 167p
Contract NAS5-1728
N64-18456
OTS $3.00

DESCRIPTORS: *Attitude control systems, *Electromagnetic properties.

AD-428 907 repriced
Westinghouse Electric Corp., Pittsburgh, Pa.
RESEARCH ON STORAGE TARGETS FOR CAMERA TUBES. Final rept., Jul 62-Sep 63, on Electron Device Technology
A. H. Boerio. Jan 63, 27p
Contract AF33(657)8676
RTD-TDR-63-4276; N64-14961
OTS $0.75

DESCRIPTORS: *Cathode ray tube screens, Secondary emission, Electrical conductance, Manufacturing methods, Distortion, *Camera tubes, Processing, Aluminum compounds, Oxides, Potassium compounds, Chlorides.

An applied research program is described on Secondary Electron Conduction (SEC) targets. The techniques used in fabricating the SEC layer, including its supporting member, are described in detail. The problems

ORNL-3563
Oak Ridge National Lab., Tenn.
THE EFFECT OF THE "TENDENCY TO REPORT INJURIES" ON MINOR ACCIDENT STATISTICS: A FOLLOW-UP STUDY
J. E. Sergent. Master's thesis. Feb 64, 57p
Contract W7405-eng-26
OTS $1.50

ORNL-3513
Oak Ridge National Lab., Tenn.
MEASUREMENTS OF RADIATION INTENSITIES IN VERTICAL CONCRETE-LINED HOLES AND AN ADJOINING TUNNEL AT THE TOWER SHIELDING FACILITY
V. R. Cain, C. E. Clifford, and L. B. Holland.
Mar 64, 86p
Contracts W7405-eng-26, AF(04-694)62-2 and OCD-OS-62-145
ORNL-TM-285
OTS $2.00

Ship Building

PB-181 675
Booz-Allen Applied Research, Inc., Bethesda, Md.
THE SURFACE EFFECT SHIP IN THE AMERICAN MERCHANT MARINE. Summary rept., part I on An Economic Feasibility Study of the 100-Ton MARAD Surface Effect Ship. Nov 63, 105p
Contract MA-3232
OTS $2.50

DESCRIPTORS: *Ships (Nonmilitary), *Merchant ships, *Marine surface propulsion, *Ground effect machines, Feasibility studies, Ranges (Distance), *Economics, Costs, *Water traffic, Meteorological parameters, Water waves, *Transportation, Mathematical models.

A summary is given of an economic feasibility study of the 100-ton MARAD surface effect ship designed for the Maritime Administration. An evaluation was made to determine the contribution that the ship can make to the Merchant Marine and determination was made of the conditions under which profitable operating conditions can be expected. The work involved analysis of current and forecast traffic patterns on a world wide basis, development of environmental criteria, determination of performance and cost characteristics of the craft, and construction of a mathematical deterministic model representing the overall problem.

PB-181 676
Booz-Allen Applied Research, Inc., Bethesda, Md.
THE SURFACE EFFECT SHIP IN THE AMERICAN MERCHANT MARINE. Final rept., part I on An Economic Feasibility Study of the 100 Ton MARAD Surface Effect Ship. Nov 63, 279p
Contract MA-3232
OTS $4.00

DESCRIPTORS: *Ships (Nonmilitary), *Merchant ships, *Marine surface propulsion, *Ground effect machines, Feasibility studies, Performance, *Transportation, *Economics, Mathematical models, Costs, Meteorological parameters, Water waves, *Water traffic, Inland waterways

The report presents the performance and operating characteristics of the SES against a background of inter-island, coastal, and inland waterway route data covering existing transportation systems, commodities carried, and the limitations due to the operational environment. The technique used in establishing the feasibility and operating economics follows the methodologies used in analyzing the cost-effectiveness of military weapon systems. First, routes, within the range capability of the SES, were established and specific environmental data obtained for each route. Second, the performance and cost characteristics were evaluated and a number of parametric functions defined, so that an economic "model" of the operation of the SES could be programmed for a CDC 160-A computer. Results of this program were compared with the most promising routes having certain well-defined characteristics with respect to actual route limitations, so that realistic direct operating costs (DOC) could be established for a comparison with other means of transportation. (Author) (See also PB-181 675)

PB-181 677
Booz-Allen Applied Research, Inc., Bethesda, Md.
THE SURFACE EFFECT SHIP IN THE AMERICAN MERCHANT MARINE. Final rept., part II on The Technical and Economic Feasibility Study of a Nuclear Powered Surface Effect Ship. Jan 64, 124p
Contract MA-3232
OTS $2.75

DESCRIPTORS: *Ships (Nonmilitary), *Merchant ships, *Ground effect machines, *Marine surface propulsion, Marine nuclear propulsion, *Nuclear-powered vessels, Design, Nuclear power plants, *Gas-cooled reactors, *Liquid metal cooled reactors, Feasibility studies, Meteorological parameters, Water waves, *Transportation, *Economics, Costs, Ship structural components, Mechanical properties.

The role of the nuclear powered surface effect ship in the American Merchant Marine is reviewed against its capability to provide unlimited range and high-speed services that could help in regaining the traffic lost to other forms of transportation. The most important single item analyzed in this study is the nuclear power plant and the ancillary hardware. The study finds that nuclear power plants suitable for surface effect ships are not immediately available, but that technology exists as a result of the aircraft nuclear power programs which can be applied to the development of plants having a specific weight of 20 pounds per shaft horsepower or less. One of these reactors, a gas-cooled reactor, is presently being considered for marine use in conjunction with a steam cycle power plant, and could also be used with gas cycle components. Another type of reactor, the sodium cooled reactor, is also suitable for use with gas cycle components, but information was not available during the study to permit appraisal of its relative merits. (Author) (See also PB-181 676)

PB-181 678
Booz-Allen Applied Research, Inc., Bethesda, Md.
THE SURFACE EFFECT SHIP IN THE AMERICAN MERCHANT MARINE. Final rept., part III on Comparative Performance and Cost Characteristics for Four Types of Surface Effect Ships. Jan 64, 50p
Contract MA-3232
OTS $1.25

NASA-TN-D-2157
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
LUNAR MISSION PERFORMANCE EVALUATION PROCEDURE FOR ORBIT-LAUNCHED NUCLEAR VEHICLES
Robert E. Austin and George B. Kearns. Apr 64, 55p
N64-18955
OTS $1.50

DESCRIPTORS: Lunar satellites, *Nuclear propulsion.

PB-165 319

Naval Ordnance Lab., White Oak, Md.
SENSITIVITY OF EXPLOSIVES IV. THE CORRELATION OF THE IMPACT SENSITIVITY OF ORGANIC HIGH EXPLOSIVES WITH THEIR THERMAL DECOMPOSITION RATES
Joseph Wenograd. 30 Sep 57, 17p
NAVORD rept. no. 5730; AD-146 047
OTS $1.60

DESCRIPTORS: *Explosive materials, Pyrolysis, Sensitivity, Thermal properties, Impact shock, Reaction kinetics.

Arrhenius parameters for the kinetics of the primary processes in the thermal decomposition of several molten, organic, high explosives are collected. Extrapolations of these rates to 500°C give values whose logarithms are proportional to logarithmic impact sensitivities as determined for these explosives by the ERL impact test at NOL. Alternatively, the temperatures at which these decompositions are calculated to have rates of 10^4 sec^{-1} are found to be a monotonic function of impact sensitivity. These correlations are interpreted to mean that a single physio-chemical quantity, the thermal decomposition rate, is the predominant factor controlling the impact sensitivity of high explosives and to give firm support to the hot spot theory of impact initiation. (Author)

N64-18500
Physical Science Lab., New Mexico State Univ. [of Agriculture, Engineering, and Science,] University Park.
MODIFICATIONS TO THE FIELD WIND WEIGHTING AND IMPACT PREDICTION PROCEDURE FOR UNGUIDED ROCKETS
Keith Hennigh. 3 Dec 63, 51p
Contract NAS5-3318
Technical memo X-51579; X-671-63-270
OTS $5.60

DESCRIPTORS: *Rockets, *Impact prediction, *Wind.

AD-423 169
RCA Defense Electronic Products, Princeton, N. J.
RESEARCH TO COMPILE UNPUBLISHED SPACE MATERIALS INFORMATION PERTAINING TO RCA SPACE CAPSULE PROGRAM. Rept. on Data Collection and Correlation
A. W. Batchlar. Oct 63, 100p
Contract AF33(657)8881
ASD-TDR-63-265
OTS $2.25

DESCRIPTORS: *Satellites (Artificial), *Space capsules, *Materials, Plastics, Silicones, Rubber coatings, Metals, *Reviews.

This report includes a compilation of monographs on "Metals and Coatings" and "Bondings and Encapsulations," and a "Materials Summary." The materials information presented refers to the resins, silicone rubber compounds, surface coatings, and metals that were used on TIROS I, II, III, and IV. Each of the materials is described in detail including such information as physical properties, electrical properties, formulations, procedures for mixing, uses, preparation of surfaces, application of mixtures, cure cycles, and the methods of testing used to determine all values. (Author)

Sanitation and Safety Engineering

AD-434 115 repriced
Northwestern Technological Inst., Evanston, Ill.
COMBUSTION OF HUMAN WASTE AND PRODUCT RECOVERY
J. E. Quon, W. O. Pipes, and J. A. Logan. Oct 63, 10p
Contract AF41(657)383
AAL-TN-62-16
OTS $0.50

DESCRIPTORS: *Wastes (Sanitary engineering), Humans, Combustion, Recovery, Algae, Kinetic theory, Temperature, *Closed ecological systems, Carbon, Oxidation.

The kinetics of combustion of volatilized wastes was studied. A new method of CO_2 analysis was tried and proved more satisfactory than the Orsat Apparatus. The new method employs the chemical reaction: $Ba(OH)_2 + CO_2 = BaCO_3 + H_2O$. The amount of $Ba(OH)_2$ which reacts with CO_2 is determined by back filtration with oxalic acid, using phenolphthalein as the indicator. An exhaust system was installed to remove the health hazard and reduce the nuisance conditions which existed when the combustion chamber is nonoperative or operating at low efficiency. It is anticipated to obtain data on the kinetics of volatilization of human wastes with the combustion chamber functioning over a wide range of efficiencies. The information obtained will enable prediction of needed capacity (size) for any specified loading, operating conditions and efficiency. The data obtained to date on the kinetics have served only to delineate the desirable operating conditions which will yield meaningful results. (Author)

AD-434 081 repriced
Northwestern Technological Inst., Evanston, Ill.
GROSS CHEMICAL CHANGE OF HUMAN WASTE UNDERGOING THERMAL DECOMPOSITION
J. E. Quon, W. O. Pipes, and J. A. Logan. Oct 63, 11p
Contract AF41(657)383
AAL-TN-62-13
OTS $0.50

DESCRIPTORS: *Wastes (Sanitary engineering), *Sewage, Degradation, Combustion, Combustion products, Gas analysis, Algae, Heat, Carbon, *Closed ecological systems.

Machine Parts and Mechanisms

AD-425 220
Mechanical Technology, Inc., Latham, N. Y.
EXPERIMENTS ON A PARTIAL ARC SELF-ACTING GAS JOURNAL BEARING
Martin W. Eusepi. Nov 63, 34p
Contract Nonr-3730(00)
Technical rept. no. MTI 63TR50
OTS $1.00

DESCRIPTORS: *Bearings, *Journal bearings, *Lubrication, *Gas bearings, Mechanical properties, Performance (Engineering).

Operational characteristics of a rotor when supported on self-acting, gas-lubricated journal bearings are reported. Experimental results for the evaluation of several parametric changes are noted. Some of these parameters included in the investigation are: elevated ambient pressure up to 500 psig; clearance ratio; length to diameter ratio; bearing load; bearing orientation. (Author)

MATERIALS

N64-17591
National Beryllia Corp., Haskell, N. J.
RESEARCH ON LOW-DENSITY THERMAL INSULATION MATERIALS FOR USE ABOVE 3000°F.
Quarterly status rept. no. 7, 1 Oct-31 Dec 63
K. H. Styhr. [1964] 23p
Contract NASr-99
NASA CR-53201
OTS $2.60

DESCRIPTORS: *Thermal insulation

AD-425 889
[New York] State Coll. of Forestry Syracuse Univ.
DESIGN CRITERIA FOR WOOD LAMINATES IN FLEXURE FOR MARINE USE. Final rept.
R. E. Pentoney. Oct 63, 186p
Contract NObs-78605
OTS $3.00

DESCRIPTORS: *Wood, *Laminates, *Plywood, Mechanical properties, Rupture, Elasticity, Strength, *Ship structural components, Design.

The study is intended to provide a further basis for assignment of design criteria for laminates manufactured from coast type Douglas-fir and from Appalachian white oak wood. Emphasis is given to laminates containing knots and knot holes and to laminates containing grain deviations on one and on two faces. The effects of knots and knot holes and their locations relative to the width of the laminate are separated. Flat and vertical grain laminations are included in the studies of Douglas-fir laminates. (Author)

AD-425 215
Textile Research Inst., Princeton, N. J.
RESILENCE OF FIBERS. Final rept., 1 Apr 50-May 63
Dillon, J. H. 11 Dec 63, 10p
Contract Nonr 09000, Nonr 09001, and Nonr-374, T. O. 1
OTS $0.50

DESCRIPTORS: *Fibers, Mechanical properties, *Elasticity, *Bibliographies.

A bibliography of the 28 Technical Reports and 49 published papers generated under the contracts.

Ceramics and Refractories

PB-165 334
[IIT Research Inst.] Chicago, Ill.
RADIATION SENSITIVE GLASSES. Quarterly rept. no. 2
L. Rieffel and R. F. Humphreys. 15 Jan 53, declassified 22 Apr 58, 85p
Contract DA36-039-sc-15528
Proj. no. 90-1228A; AD-1739
OTS $8.10

DESCRIPTORS: *Glass, Radiation damage, Sensitivity, Tellurium, Lead compound, Chemical analysis, Ceramic materials,

Progress is reported along the lines of establishing in more detail the influence of order in glass networks on radiation sensitivity. A quantitative theory of the energy transfer mechanism is evolved and critical tests on its validity are designed. Research is reported on tellurium-containing glass in an attempt to establish validity of the weak network hypothesis as previously described.

PB-165 335
[IIT Research Inst.] Chicago, Ill.
RADIATION SENSITIVE GLASSES. Quarterly rept. no. 3
L. Reiffel and R. F. Humphreys. 10 Mar 53, declassified 28 Aug 59, 53p
Proj. no. A 031-4; AD-9426
OTS $5.60

DESCRIPTORS: *Glass, Radiation damage, Heat treatment, Structural properties, Sensitivity, Color centers, *Ceramic materials, Chemical analysis,

See also PB-165 334

PB-165 336
[IIT Research Inst.] Chicago, Ill.
RADIATION SENSITIVE GLASSES. Quarterly rept. no. 4, 1 Mar-1 Jun 53
D. Kazen, L. Reiffel, and R. F. Humphreys. 10 Jul 53, declassified 21 Oct 59, 21p
Contract DA36-039-sc-15528
Proj. no. A 031-4; AD-16 150
OTS $2.60

DESCRIPTORS: *Glass, Radiation damage, Heat treatment, X-ray diffraction analysis, Reduction (Chemistry), Chemical analysis, Barium, Boron, Carbon, Sensitivity,

DESCRIPTORS: *Ships (Nonmilitary), *Merchant ships, *Marine surface propulsion, *Ground effect machines, *Nuclear powered vessels, Airfoils, Ducted fans, Feasibility studies, Performance, Power, Machinery, Ship auxiliary equipment, Ship structural components, Weight, *Transportation, *Economics, Costs,

Comparisons are given of performance requirements, power requirements, machinery weight, equipment weight, structural weight, and costs and other economic characteristics of the following surface effect ships: MARAD channel flow SES; nuclear-powered annular jet SES; chemically-powered annular jet SES; airfoil type SES. (See also PB-181 677)

OTS SB-529
Office of Technical Services, Dept. of Commerce, Washington, D. C.
HYDROFOIL BOATS. Dec 63, 8p
OTS Selective Bibliography SB-529
OTS $0.10

DESCRIPTORS: *Ships, Boats, *Hydrofoil boats, *Bibliographies.

Lists 58 references to reports and translations added to the OTS collection through December 1963. Includes reports and translations on: various kinds of hydrofoil craft, including passenger boats, sea-cruising cutter, smoke-laying craft, missile range patrol boat; hydrodynamic characteristics; special gas turbine engine for ships fitted with hydrofoils; motions in smooth water, in regular waves, in irregular seas; economic feasibility.

concern are penetrations, closure attachment, frame attachment, cylinder joints, and machinery-equipment installation and attachment. (Author)

AD-405 551
Thompson (H. I.) Fiber Glass Co., Gardena, Calif.
INVESTIGATION OF STRUCTURAL PROBLEMS WITH FILAMENT WOUND DEEP SUBMERSIBLES. Quarterly rept. no. 1, 17 Jan-16 Apr 63
N. Myers and G. Lee. Apr 63, 124p
Contract NObs-88351
OTS $10.10

DESCRIPTORS: *Submarine hulls, Submarine models, *Filament wound construction, *Stiffened cylinders, Hemispherical shells, *Glass textiles, Theory, Measurement, Configuration, Seals (Stoppers), Test facilities, Hydrostatics, Fatigue (Mechanics), Mathematical analysis, Manufacturing methods, Test methods, Thickness, Joints, High-pressure research, Equations, Structural properties, Stresses.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Engines and Propulsion Systems

ANL-6802
Argonne National Lab., Ill.
AMU-ANL CONFERENCE ON DIRECT ENERGY CONVERSION, NOVEMBER 4-5, 1963. Dec 63, 190p
Contract W31-109-eng-38
OTS $2.75

N64-18216
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ELECTRICAL PROPULSION REQUIREMENTS FOR PLANETARY AND INTERPLANETARY SPACECRAFT
John W. Stearns. 1 Mar 64, 13p
Contract NAS7-100
Technical rept. no. 32-403; NASA CR-53531
OTS $1.60

DESCRIPTORS: *Electric propulsion, *Spacecraft,

PB-165 338
Rohm and Haas Co., Huntsville, Ala.
ENGINEERING RESEARCH. Quarterly progress rept. no. 23, 15 Sep-15 Dec 60
H. T. Downing, R. M. Sanders, J. D. Clem, Jr., P. G. Norris, and C. E. Thies. 20 Mar 61, 29p
Contracts DA01-021-ORD-5135 and DA01-021-ORD-11878
Rept. no. P-60-23; AD-253 319
OTS $2.60

DESCRIPTORS: *Rocket motor nozzles, Graphite, Phenolic plastics, *Rocket motors (Solid propellant), Solid rocket propellants, Tests, Cermets, Molybdenum, Silicon compounds, Nitrides, Tungsten alloys, Aluminum alloys, Dioxides, Erosion, Test equipment, Materials

Standardized tests were made to evaluate a variety of rocket nozzle throat insert and expansion cone materials. The materials were tested for approximately 9 sec with a high-energy, aluminized, solid propellant. Nozzle throat insert materials tested included graphite, molybdenum, tungsten-aluminum oxide cermet, tungsten-beryllium oxide cermet, fused silica, and silicon-nitride-bonded silicon carbide. Expansion cone ceramics (fused silica and silicon-nitride-bonded silicon carbide) and reinforced plastic compositions (primarily phenolics with a variety of filler materials) were evaluated. A method of estimating the instantaneous nozzle throat area at any time during testing was developed allowing nozzle erosion rates to be estimated. Tests indicated that the erosion resistance of graphite throat inserts increased with increasing density. Among the reinforced plastic expansion cone materials, the graphite cloth-phenolics and silica glass-phenolics were the most erosion resistant. An investigation was made of material, sealing, and rotational problems associated with a thrust vector control system utilizing four rotating nozzle. (Author)

N64-17675
Sperry Gyroscope Co., Great Neck, N. Y.
ROCKET ENGINE ANALYZER AND DECISION INSTRUMENTATION (READI) INVESTIGATION. Final rept., Phase II
E. S. Joline, R. L. Smith, D. P. Blowney, J. J. Best, and J. Harrison. Dec 63, 300p
Contract NAS8-4003
Rept. no. HB-9221-0035; NASA CR-55842
OTS $18.50

DESCRIPTORS: *Rocket motors, Rocket propulsion, *Test equipment (Electronics).

MATHEMATICS

ANL-6820
Argonne National Lab., Ill.
ASYMPTOTIC SOLUTIONS TO COMPOUND DECISION PROBLEMS
John R. Van Ryzin. Doctoral thesis. Feb 64, 101p
Contract W31-109-eng-38
OTS $2.25

PB-165 321
[Ballistic Research Labs., Aberdeen Proving Ground, Md.]
CALCULATION OF ENGAGEMENT KILL PROBABILITY WHEN THE AIMING ERRORS OF THE ROUND FIRED IN THE ENGAGEMENT ARE NOT INDEPENDENT. PAPER PRESENTED AT FIRE CONTROL CONFERENCE (NO. 2), MARCH 1955
H. L. Merritt and F. G. King. [1955] 12p
OTS $1.60

DESCRIPTORS: *Applied mathematics, *Armed forces operations, Warfare, Mathematical models, *Gunnery, Effectiveness, *Kill probabilities, Optimization, Targets, Fire control systems.

AD-280 119
Columbia Univ., New York. School of Engineering.
RESEARCH ON TECHNICAL APPLICATIONS OF EXTREME VALUES. Final rept.
Sebastian B. Littauer and Emil J. Gumbel. 1 Apr 62, 31p
Contract DA30-069-ORD-1061
AROD no. 1716:17; N62-11663
OTS $3.60

DESCRIPTORS: *Applied mathematics, *Statistical analysis, Theory, Complex variables, *Distribution theory, Materials, *Fatigue (Mechanics), *Strength, *Hydrology,

The primary applications of the statistical theory of extreme values have been to breaking strength and fatigue of materials. Other applications have been made to hydrology. In order, however, to provide the techniques which were effective in these applications it was necessary to conduct research in general statistical theory as well as in the statistical theory of extreme values. These researches are summarized in the report. (Author)
(See also AD-256 977)

ORNL-3567
Oak Ridge National Lab., Tenn.
MATHEMATICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1963.
Mar 64, 59p
Contract W7405-eng-26
OTS $1.50

ORNL-3583
Oak Ridge National Lab., Tenn.
A NOTE ON IMPORTANCE FUNCTIONS FOR THE SHIELDING OF MANNED SPACE VEHICLES
R. G. Alsmiller, Jr. Mar 64, 29p
Contract W7405-eng-26
NASA Order nos. T-7632 and R-104
OTS $0.75

AD-413 128
Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.
APPLIED MULTIPLE LINEAR REGRESSION
Robert A. Bottenberg and Joe H. Ward, Jr. Mar 63, 148p
PRL-TDR-63-6
OTS $2.75

DESCRIPTORS: *Applied mathematics, *Psychometrics, Design, *Combinatorial analysis, Statistical analysis, *Mathematical prediction, *Statistical tests, Scientific research, *Decision making, *Vector analysis, *Matrix algebra,

This volume develops the application of multiple linear regression as a general approach to the formulation and analysis of research problems. The approach, while powerful, is direct and conceptually simple, less restrictive than multivariate correlation techniques, and suited to problems involving binary-coded information. Illustrative problems are largely from the behavioral sciences. The chapters cover: introduction to vectors, formulation of problems with categorical and continuous predictors, generation of new vectors, treatment effects obtained in presence of concomitant variables, and other applications of the general regression approach.

N64-17584
Radioscience Lab., Stanford Univ., Calif.
A MODEL FOKKER-PLANCK EQUATION FOR A PLASMA AND ITS SOLUTION
J. P. Dougherty. (Cambridge Univ.). [1964] 35p
Grant NsG-377
Scientific rept. SEL-64-003; NASA CR-53200
OTS $3.60

DESCRIPTORS: *Plasma physics, *Partial differential equations.

N64-18448
Rias, Inc., Baltimore, Md.
ON THE PARAMETRIZATION OF THE THREE-DIMENSIONAL ROTATION GROUP
John Stuelpnagel. [1958] 16p
Contracts NASw-845; AF49(638)1242, and Nonr-3693(00)
NASA CR-53568
OTS $1.60

DESCRIPTORS: *Groups (Mathematics), *Topology, Equations of motion, Euler's angle, Matrix algebra.

N64-18429
Space Sciences Lab., Univ. of California, Berkeley.
ON THE EVALUATION OF OPTIMAL AND NON-OPTIMAL CONTROL STRATEGIES
E. Polak. 27 Feb 64, 9p
Grant NsG-354
Series no. 5, issue no. 12; NASA CR-53593
OTS $1.10

DESCRIPTORS: *Control systems, *Control theory, Performance (Engineering).

Results of heat-treatment and x-ray diffraction studies with K-48-type glass confirmed earlier results of ordering experiments. Experiments with BC-2 glasses indicated that similar effects were produced by a reduction in the alkali-ion content of Ba-crown glasses. (DDC abstract) (See also PB-165 335)

AD-425 080
Illinois Univ., Urbana.
THE EFFECTS OF HEATING ON THE ROOM TEMPERATURE STRENGTH OF PRISTINE E-GLASS RODS
N. M. Cameron. Nov 63, 45p
Contract Nonr-2947(02) (X)
T&AM rept. no. 252
OTS $1.25

DESCRIPTORS: *Glass, Rods, Strength, Thermal properties, Microstructure, Electron microscopy

The influence of temperature on the room temperature strength of E-glass rods was studied. Groups of rods were heated in air at various temperatures in the range from 160°F to 1100°F. The strength versus temperature relation was found to be qualitatively similar to that determined for E-glass fibres. Light and electron micrographs were made of the rod surface after various treatments. It is suggested that the most likely reason for the strength decrease, observed after heating, is an ordering or devitrification at the rod surface. (Author)

AD-423 686
Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
DIELECTRIC CONSTANT AND LOSS MEASUREMENTS OF HIGH-TEMPERATURE MATERIALS
W. B. Westphal. Oct 63, 87p
Contract AF33(616)8353
[Technical rept. no. 182]; N64-12814
OTS $2.25

DESCRIPTORS: *Microwave equipment, *Refractory materials, *Dielectrics, Aluminum compounds, Chromium compounds, Magnesium compounds, Lantanum compounds, Yttrium compounds, Beryllium compounds, Tantalum compounds, Thorium compounds, Boron compounds, Oxides, Silicates, Nitrides, Glass, Dielectric properties

Measurement techniques for the frequency range 10^2 to about 2.5×10^{10} are discussed for temperatures to 1650°C. These include the use of bridges, resonant circuits, standing-wave methods, and resonant cavities. Data on crystals of Al_2O_3, Cr_2O_3, MgO, $LaAlO_3$, Y_2O_3; on multicrystalline bodies of Al_2O_3, BeO, MgO, Mg_2SiO_4, Ta_2O_5, ThO; on glass ceramics, silica glass, and BN are presented over smaller temperature and frequency ranges. Pyrolitic BN has a low loss tangent (0.0004 at 1375°C, 4.8×10^9 cps) and a low temperature coefficient of dielectric constant. Some aluminas and silicas exhibit loss tangents of ca. 0.0006 at 1000°C in the microwave region. Microwave losses are due partly to the charge transfer responsible for low-frequency conductivity and to the vibration spectra of infrared absorption. Both losses are increased by the addition of impurities. (Author)

Plastics

AD-423 389
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
INSPECTION OF THICK POLYETHYLENE SECTIONS BY RADIOGRAPHY AND FLUOROSCOPY
James Begley. Oct 63, 15p
Technical memo. 1145; N64-12344
OTS $0.50

DESCRIPTORS: *Polyethylene plastics, Boron, *Nondestructive testing, *X-ray photography, Radiography, Fluoroscopes, Shielding

A 12 inch x 12 inch x 1 1/2 inch penetrameter was made from high-density polyethylene containing less than 10% amorphous boron. Fourteen other blocks of the same dimensions and material were fabricated; these blocks were void-free. The total thickness of the test specimen was 22 1/2 inches, including the penetrameter. A series of tests was run to determine the detectability of various size voids through different thicknesses of material. Test results showed that, using a cobalt-60 source, voids 1/2 inch long x 1/8 inch deep were detectable through the entire 22 1/2 inches of borated polyethylene. In an attempt to use a similar technique as a rapid scanning process, x-ray equipment (150 kv) was teamed with image intensification on a fluoroscopic screen. The smallest void detectable through 12 inches of polyethylene was 1/4 inch long by 1/2 inch deep. (Author)

AD-425 079
Frick Chemical Lab., Princeton Univ., N. J.
VISCOELASTIC PROPERTIES OF STYRENE-ACENAPHTHLYENE COPOLYMERS IN THE TRANSITION REGION
R. J. Schaffhauser, M. C. Shen, and A. V. Tobolsky. Nov 63, 21p
Contract Nonr-1858(07)
ONR Technical rept. RLT-66; N64-12817
OTS $0.75

DESCRIPTORS: *Styrene plastics, Polycyclic compounds, Copolymerization, *Polymers, Elasticity, Viscosity, Thermal properties.

A series of sytene-acenaphthylene copolymers was prepared by thermal polymerization. Homogeneous samples were obtained except for those compositions where the initial concentration of styrene monomer was 40 to 60 mole per cent. Master curves and characteristic viscoelastic parameters were obtained for the homogeneous copolymers. The plot of T_g versus copolymer composition yielded a linear relationship. (Author)

N64-18298
Allied Research Associates, Inc., Concord, Mass.
ELASTIC STABILITY OF CYLINDRICAL SHELLS UNDER AXIAL AND LATERAL LOADS
C. Lakshmikantham and George Gerard. 10 Feb 64, 10p
Contract NASw-682
Tech. rept. 235-4; NASA CR-53361
OTS $1.10

DESCRIPTORS: *Cylindrical shells, *Stability,

PB-165 329
Brigham Young Univ., Provo, Utah.
NATURAL FREQUENCIES OF PLATES WITH OPPOSITE EDGES SUPPORTED. Technical rept. no. 6, 15 Jun-15 Sep 56
Harvey J. Fletcher, Norman Woodfield, and Kenneth Larsen. 12 Sep 56, 18p
Contract DA04-495-ORD-560
OOR Proj. no. 1110; AD-107 224
OTS $1.60

DESCRIPTORS: *Vibration, Frequency, Sheets, *Functions, Equations, Mathematical analysis

Eigenfunctions and eigenvalues (natural frequencies) are evaluated for a thin square plate with two opposite edges supported. Three cases are treated: (a) One edge free and one edge clamped (b) One edge free and one edge supported (c) Two edges free. (Author)

PB-165 317
Columbia Univ., New York
TABLES FOR FREQUENCIES AND MODES OF FREE VIBRATION OF INFINITELY LONG, THIN, CYLINDRICAL SHELLS. Technical rept. no. 7
M. L. Baron and H. H. Bleich. Sep 52, 35p
Contract Nonr-266(08)
ATI-197 792
OTS $3.60

DESCRIPTORS: *Tables, Frequency, *Vibration, *Cylindrical bodies,

AD-425 217
[Hydronautics, Inc., Laurel, Md.]
EXPERIMENTAL INVESTIGATION OF GAS LUBRICATED WATER BOUNDARY LAYERS
Harold M. Stoller. May 63, 50p
Contract NOw-60-0111-c
Technical rept. 007-3
OTS $1.25

DESCRIPTORS: *Ship hulls, *Lubrication, Gases, Water, *Fluid flow, Two-dimensional flow, Three-dimensional flow, Boundry layer, *Hydrodynamic configurations, Flat plate, Parabolic bodies, Drag.

Gas lubrication experiments were conducted on two-dimensional and three-dimensional models. Thin films of maximum length of four to six inches were observed on the two-dimensional flat plate model at low water speeds and air flow rates. Comparable length films were observed on the paraboloid of revolution model under approximately the same conditions. Additional observations on gas lubrication are presented for low water speeds, including the "shedding" phenomenon. Drag reduction experiments were conducted on the paraboloid of revolution at water speeds of 20-35 f. p. s. Results indicate that the percentage drag reduction produced by the coarse air layer was proportional to the water speed, reaching a maximum of 10% at the maximum speed tested of 35 f. p. s. In addition, the hydrodynamic lift on the model was unaffected by the air layer. (Author)

NASA-TN-D-2262
Ling-Temco-Vought, Inc., Dallas, Tex.
SIMILAR SOLUTIONS OF THE BOUNDARY LAYER EQUATIONS FOR PURELY VISCOUS NON-NEWTONIAN FLUIDS
C. Sinclair Wells, Jr. Apr 64, 36p
Contract NASw-792
N64-18735
OTS $1.00

DESCRIPTORS: *Fluid flow, *Boundary layer, *Differential equations.

AD-423 379
Poulter Labs., Stanford Research Inst., Menlo Park, Calif.
SHOCK-WAVE ATTENUATION IN ELASTIC-RIGID FOAMS. Rept. for 1 Jul 62-1 Jul 63
John R. Rempel. Oct 63, 119p
Contract AF29(601)4363
SRI Proj. PGU-3581; RTD-TDR-63-3056
OTS $2.50

DESCRIPTORS: *Foams, *Expanded plastics, *Isocyanate plastics, *Foamed metals, *Aluminum, Porous materials, Silicon compounds, Dioxides, *Graphite, Compressive properties, Elasticity, *Shocm waves, Attenuation, Test methods, Photographic analysis

Described are experimental techniques for the study of the response of foamed or distended materials to impact loading and the results of applying these techniques to four different kinds of foam—polyurethane, aluminum, silica, and graphite. An approximate theory for calculating the behavior of elastic-rigid locking solids is developed and applied to the materials tested. Within certain limits agreement with experiment is good, and at least for some materials within a range of impact momenta the internal pressure history can be logically related to measurements of quasi-static compression, although better agreement is possible when certain parameters are measured dynamically. (Author)

AD-424 879
Watervliet Arsenal, N. Y.
BOUNDARY LAYER IN COUPLE-STRESS ELASTICITY AND STIFFENING OF THIN LAYERS IN SHEAR. Technical rept.
M. A. Sadowsky, Y. C. Hsu, and M. A. Hussain. Oct 63, 55p
WVT-RR-6320
OTS $1.50

DESCRIPTORS: *Composite materials, Particles, Fibers, *Brazing, Welding, Microstructure, *Stresses, Mathematical analysis, Boundary layer, *Elasticity, Theory.

Couple-stress elasticity theory shows the presence of an elastic boundary layer of minute thickness in which the states of stress and displacement differ essentially and significantly from classical elasticity solutions. The boundary layer effect becomes dominating for microbodies and microlayers such as microfibers in composites and brazing layers in welding. (Author)

N64-18430
Space Sciences Lab., Univ. of California, Berkeley.
THEORY OF A CLASS OF DISCRETE OPTIMAL CONTROL SYSTEMS
B. W. Jordan and E. Polak. 17 Jan 64, 23p
Grants NsG-354 and AF AFOSR 139-63
Series no. 5, issue no. 18; NASA CR-53583
OTS $2.60

DESCRIPTORS: *Control systems, *Control theory, Difference equations.

Computing Devices

N64-18476
Emerson Electric Mfg. Co., St. Louis, Mo.
DIGITAL ADAPTIVE CONTROL SYSTEM RESEARCH.
Quarterly progress rept. no. 4, 1 Nov 63-31 Jan 64
John Zaborsky, Wayne L. Humphrey, Richard E. Janitch, Louis M. Woltmann, and E. Edward Buder.
21 Feb 64, 54p
Contract NASw-599
Rept. no. 1544-4; NASA CR-53610
OTS $5.60

DESCRIPTORS: *Adaptive control systems, *Digital systems, Analog-digital computers, Simulation.

N64-18452
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A SET OF ALGORITHMS FOR A DIAGNOSABLE ARITHMETIC UNIT
Algirdas Avizienis. 1 Mar 64, 34p
Contract NAS7-100
Technical rept. no. 32-546; NASA CR-53575
OTS $3.60

DESCRIPTORS: *Algorithms, *Digital computers,

UCRL-7619
Lawrence Radiation Lab., Univ. of California, Livermore.
A PRECISION FLYING SPOT FILM DIGITIZER
Jerome A. G. Russell. 13 Dec 63, 12p
Contract W7405-eng-48
OTS $0.50

NASA-TN-D-2174
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
AN OPTIMIZED PRINTER PLOTTING SYSTEM CONSISTING OF COMPLEMENTARY 7090 (FORTRAN) AND 1401 (SPS) SUBROUTINES PART I - INSTRUCTIONS FOR USERS
Lois T. Dellner and Betty Jo Moore. Apr 64, 31p
N64-18728
OTS $0.75

DESCRIPTORS: *Programming (Computers), Programming languages, *Instruction manuals.

NASA-TN-D-2175
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
AN OPTIMIZED PRINTER PLOTTING SYSTEM CONSISTING OF COMPLEMENTARY 7090 (FORTRAN) AND 1401 (SPS) SUBROUTINES. PART II: SYSTEMS PROGRAMMERS MANUAL
Lois T. Dellner and Betty Jo Moore. Apr 64, 114p
N64-18729
OTS $2.50

DESCRIPTORS: *Programming (Computers), Programming languages, *Instruction manuals.

AD-289 659
Missile Div., Chrysler Corp., Detroit, Mich.
ENGINEERING APPLICATIONS OF THE CARD PROGRAMMED CALCULATOR. Technical memo.
A. H. Albert. 8 Sep 54, 7p
Contract DA20-018-ORD-12749
Rept. no. AD-M13
OTS $1.10

DESCRIPTORS: *Digital computers, Punched card methods, Simultaneous equations, Differential equations, Partial differential equations, Polynomials,

This report describes the IBM-CPC computer as a high-speed calculating machine with a powerful potential for engineering use. The capabilities of the machine discussed in the report make it very suitable for the complex calculations often required in engineering analysis. Examples of such calculations are cited. (Author)

ORNL-3554
Oak Ridge National Lab., Tenn.
A FORTRAN PROGRAM FOR ESTIMATING RESIDUAL RADIATION LEVELS IN HIGH-ENERGY CHARGED-PARTICLE ACCELERATORS
J. B. Ball and C. B. Fulmer. Mar 64, 14p
Contract W7405-eng-26
OTS $0.50

ORNL-3581
Oak Ridge National Lab., Tenn.
INTRIQUE, AN IBM-7090 SUBROUTINE PACKAGE FOR MAKING LINEAR, LOGARITHMIC AND SEMILOGRITHMIC GRAPHS USING THE CALCOMP PLOTTER
M. B. Emmett. Mar 64, 14p
Contract W7405-eng-26
OTS $0.50

MECHANICS

N64-18297
Allied Research Associates, Inc., Concord, Mass.
ELASTIC AND PLASTIC STABILITY OF GEOMETRICALLY ORTHOTROPIC SPHERICAL SHELLS
C. Lakshmikantham and George Gerard. 15 Jan 64, 8p
Contract NASw-682
Tech. rept. 235-3; NASA CR-53354
OTS $1.10

DESCRIPTORS: *Structural shells, Stability,

ORNL-3398
Oak Ridge National Lab., Tenn.
THE EFFECT OF STRESS STATE ON HIGH-TEMPERATURE LOW-CYCLE FATIGUE
C. R. Kennedy. [21 Mar 63] 25p
Contract W7405-eng-26
OTS $2.60

AD-285 514
Vitro Labs., West Orange, N. J.
FABRICATION OF CUTTING TOOLS BY ELECTROPHORETIC DEPOSITION. Final technical engineering rept., 3 Oct 61-31 May 62
M. H. Ortner and K. A. Gebler. Jul 62, 109p
Contract AF33(600)41436
Rept. no. VL-2211-22-0; ASD-TR-62-7-868
OTS $9.10

DESCRIPTORS: *Cutting tools, Manufacturing methods, Electrophoresis, Electrodeposition, Coatings, Tungsten alloys, Molybdenum alloys, Zirconium alloys, Carbides, Carbide tools, Chromium alloys, Hot working, Drills, Lathe tools, Tests, Machining, Effectiveness, Alloys, Taps, Powder metallurgy, Airframes,

A variety of substrate materials were developed as substitutes for heavy metal alloy. These included molybdenum TZM alloy, Zircaloy-2, and molybdenum-modified heavy metal. Coated lathe tools prepared on these substrates yielded four to eight times the life of solid carbide tools in turning 52 R_C steel at speeds to 250 f.p.m. Heavy metal alloy unless adequately supported, is not a satisfactory substrate for carbide-coated rotary tools since it deforms during hot-pressing. With a change from the deformable heavy metal tap substrate to a non-deformable TZM tap substrate the hardness of the carbide coating increased from 950 Kg/mm^2 to 1750 kg/mm^2, and the porosity of the coating decreased almost to zero. (Author)

Light Metals

AD-423 398
Aluminum Co. of America, [New Kensington, Pa.]
DEVELOPMENT OF ALUMINUM-BASE ALLOYS, Annual progress rept. no. 2, 29 Sep 61-30 Sep 63
A. P. Haarr. 30 Oct 63, 78p
Contract DA36-034-ORD-3559RD
Rept. no. 7-63-AP59-S; N64-12867
OTS $2.00

DESCRIPTORS: *Aluminum alloys, Zinc alloys, Magnesium alloys, Manganese alloys, Iron alloys, Nickel alloys, *Powder metallurgy, Extrusion, Tensile properties, Ductility, Forging, Rolling (Metallurgy), Rocket cases,

A tensile strength of 127,500 psi and a yield strength of 124,400 psi were obtained in an aluminum powder metallurgy alloy extrusion by combining precipitation hardening with dispersion hardening. High temperature solution heat treatment, high quenching rate, and long aging time were required to achieve these properties in an alloy containing 9.8 Zn, 4.0 Mg, .8 Cu, 1.1 Mn, 1.0 Fe, 1.3 Ni, .01 Cr, and .01 Ti. Five other alloys have achieved yield strengths of 120,000 psi or higher. The alloys all had low ductility, generally less than 1.0% for those having the higher tensile properties. Extruded sections have been hot forged with success. The forged billets have been fabricated into sheet by hot rolling only. (Author) (See also AD-289 526)

N64-18305
Rensselaer Polytechnic Inst., Troy, N. Y.
THE INFLUENCE OF THERMAL TREATMENTS UPON THE MICROSTRUCTURE AND MECHANICAL PROPERTIES OF ALUMINUM-ALUMINUM OXIDE ALLOYS
J. A. Dromsky (Doctoral thesis) and F. V. Lenel. 1963, 29p
Grant NsG-38-60
NASA CR-53558
OTS $2.60

DESCRIPTORS: *Aluminum alloys, Oxides, Microstructure, Mechanical properties, Heat treatment,

Structural Metallurgy and Corrosion

AD-423 387
General Dynamics/Fort Worth, Tex.
STRESS CORROSION CRACKING IN HIGH STRENGTH FERROUS ALLOYS
J. F. Hildebrand, E. W. Turns, and F. C. Nordquist. [1963] 46p
Contracts AF33(600)36200 and AF33(600)41891
Rept. no. FZM-2690
OTS $1.25

DESCRIPTORS: *Steel, Stresses, Fracture (Mechanics), *Corrosion inhibition, Protective coverings, *Coatings, *Electroplating, *Silicone plastics, *Nickel, *Cadmium, Silver, Copper, Aluminum,

The paper describes tests performed to investigate the stress corrosion cracking of AISI Type 4340 steel in the 260,000- to 292,000 psi strength range. Various protective coatings were evaluated comparatively on the basis of a sustained axial tensile load equivalent to 70% of the ultimate strength. The results indicated that the peened surface had more resistance to cracking than the machined surface. Electrodeposited silver and copper increased the susceptibility as did electroless nickel, vapor-deposited aluminum, and dry film lubricant. A patented Electrolized plate, a silicone paint, and a flame sprayed aluminum coating provided good corrosion protection for the machined surface. Nickel-cadmium diffusion coating provided satisfactory protection at a lower strength level. Erratic results were obtained when some of the coatings were applied to specimens cut from a forging. Bent beam specimen tests determined the effects of anodic and cathodic metals in contact with AISI 4340. Results revealed that contact with anodic metals increased slightly the resistance to stress corrosion cracking. (Author)

HW 77529
Hanford Atomic Products Operation, Richland, Wash.
EFFECT OF OXIDE DISSOLUTION AND HEAT TRANSFER ON THE CORROSION OF ALUMINUM FUEL CLADDING
D. R. Dickinson and R. J. Lobsinger. Dec 63, 18p
Contract AT(45-1)1350
OTS $0.50

NASA-TN-D-2239
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AERODYNAMIC AND ROCKET BRAKING OF BLUNT NONLIFTING VEHICLES ENTERING THE EARTH'S ATMOSPHERE AT VERY HIGH SPEEDS
Kenneth K. Yoshikawa and Bradford H. Wick. Apr 64, 39p
N64-18731
OTS $1.00

DESCRIPTORS: *Atmosphere entry, *Aerodynamic characteristics, Blunt bodies.

NASA-TN-D-2236
Ames Research Center, National Aeronatics and Space Administration, Moffett Field, Calif.
EFFECTS OF SPANWISE VARIATION OF LEADING-EDGE SWEEP ON THE LIFT, DRAG, AND PITCHING MOMENT OF A WING-BODY COMBINATION AT MACH NUMBERS FROM 0.7 TO 2.94
Raymond M. Hicks and Edward J. Hopkins. Apr 64, 56p
N64-17991
OTS $1.50

DESCRIPTORS: *Wing-body configurations, *Aerodynamic characteristics

NASA-TN-D-2247
Douglas Aircraft Co., Inc., Long Beach, Calif.
WIND TUNNEL INVESTIGATION OF TURBULENT BOUNDARY LAYER NOISE AS RELATED TO DESIGN CRITERIA FOR HIGH PERFORMANCE VEHICLES
J. S. Murphy, W. W. Speaker, D. A. Bies, and P. A. Franken (Bolt, Beranek, and Newman, Inc.). Apr 64, 91p
Contract NASr-110
N64-18733
OTS $2.25

DESCRIPTORS: *Turbulent boundary layer, *Noise, *Aerodynamic characteristics.

NASA-TN-D-2054
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECT OF CONTROLLED SURFACE ROUGHNESS ON BOUNDARY-LAYER TRANSITION AND HEAT TRANSFER AT MACH NUMBERS OF 4.8 AND 6.0
Paul F. Holloway and James R. Sterrett. Apr 64, 47p
N64-18953
OTS $1.25

DESCRIPTORS: Surface properties, *Boundary layer transition, *Heat transfer.

NASA-TR-R-165
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
WALL-PRESSURE FLUCTUATIONS AND PRESSURE-VELOCITY CORRELATIONS IN A TURBULENT BOUNDARY LAYER
John S. Serafini (Doctoral thesis). Dec 63, 81p
N64-17994
OTS $2.00

DESCRIPTORS: *Turbulent boundary layer, Pressure.

NAA-SR-7398
Atomics International, Canoga Park, Calif.
PULSE HEATING OF ZIRCONIUM-URANIUM HYDRIDES
R. E. Taylor, H. G. Weidberg, and R. T. Albee. [30 Dec 62] 25p
Contract AT(11-1)GEN-8
OTS $2.60

DESCRIPTORS: *Uranium, *Zirconium, *Hydrides

AD-424 097
Defense Metals Information Center, Columbus, Ohio.
CREEP OF COLUMBIUM ALLOYS
E. S. Bartlett and J. A. VanEcho. 24 Jun 63, 96p
Contract AF33(616)7747
DMIC memo. 170; N64-12045
OTS $2.25

DESCRIPTORS: *Refractory metal alloys, *Niobium alloys, *Creep, Tables, Zirconium alloys, Tantalum alloys, Tungsten alloys, Molybdenum alloys, Titanium alloys, Vanadium alloys, Hafnium alloys.

The purpose of the memorandum is to compile and review existing creep data for columbium alloys to gain insight into their merits and limitations for time-dependent structural service. Alloys considered are: Nb-1Zr, FS82, F48, FS85, D31, Cb752, B66, AS55, B33, SCb291, C129, and D36.

AD-428 226 repriced
Naval Research Lab., Washington, D. C.
THE EFFECT OF SPECIMEN SIZE ON THE FATIGUE CRACK STRENGTH OF CYLINDRICAL SPECIMENS OF HEAT-TREATED 4340 STEEL. Final rept.
E. P. Klier. 16 Dec 63, 17p
NRL rept. no. 6012
OTS $0.50

DESCRIPTORS: *Steel, *Fracture (Mechanics), Test methods, Fatigue (Mechanics), Tensile properties, Ductility, Brittleness, Stresses, Strain (Mechanics), Energy, Absorption, Heat treatment, Low temperature research, Cryogenics, Transition temperature.

The present series of tests for a one-inch-diameter fatigue-notched specimen constitutes an extension of a previous series of tests for a one-half-inch-diameter specimen. The principal change introduced is the specimen size. This change in specimen size leads to minor variations in the fatigue-notch tensile-strength data, but for certain material conditions and specimen-size ranges the notch strength can be profoundly altered. The ductile-brittle transition indicated is critically dependent on tensile strength. During the present tests load-elongation curves were taken, and these have allowed the examination of the ductile-brittle transition as established by stress, by strain, and by means of energy absorption. The experiments suggest that the stress-strain relations in certain fracture tests correspond to those measured for the notch tensile test. (Author)

ORNL-3570
Oak Ridge National Lab., Tenn.
A SOLUTION TO THE NUCLEON-MESON CASCADE EQUATION UNDER VERY SPECIAL CONDITIONS
R. G. Alsmiller, Jr. Mar 64, 26p
Contract W7405-eng-26
OTS $0.75

ORNL-3558
Oak Ridge National Lab., Tenn.
TRANSURANIUM QUARTERLY PROGRESS REPORT FOR PERIOD ENDING AUGUST 31, 1963
W. D. Burch, comp. Mar 64, 121p
Contract W7405-eng-26
OTS $2.50

IDO-16757
Phillips Petroleum Co., Idaho Falls.
RADIOACTIVE DECAY OF Pm^{148} AND Pm^{148m}
C. W. Reich, R. P. Schuman, J. R. Berreth, M. K. Brice, and R. L. Heath. 23 Jul 62, 28p
Contract AT(10-1)205
OTS $2.60

CONF-187-113
Rensselaer Polytechnic Inst., Troy, N. Y.
WATER SPECTRA AND ENERGY EXCHANGE KERNELS
P. B. Daitch and M. J. Ohanian. 31 Jul 63, 12p
Contract AT(30-3)328
OTS $1.60

DESCRIPTORS: *Water, *Neutron spectrum

American Nuclear Society Winter Meeting, Washington, D. C. Nov 63. Previously announced incorrectly as CONF-11-5.

Elementary Particles

NASA-TN-D-2120
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A FORTRAN PROGRAM FOR ANALYSIS OF SPIN ZERO ELASTIC SCATTERING WITH THE NUCLEAR OPTICAL MODEL
C. C. Giamati, W. Tobocman, and D. V. Renkel. Apr 64, 53p
N64-18079
OTS $1.25

DESCRIPTORS: *Elastic scattering, *Programming (Computers)

N64-17577
Stanford Research Inst., Menlo Park, Calif.
THREE-PARTICLE SCATTERING. II. IN SPACE
R. C. Whitten. [1963] 25p
Contract NASr-49(07)
NASA CR-53233
OTS $2.60

DESCRIPTORS: *N-body problem, *Particles, Scattering,

Instruments and Installations

AD-283 918
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
THERMOLUMINESCENT DOSIMETER COMPUTER-INDICATOR SYSTEM. Final development rept. on Phase 1, 3 Jul-3 Sep 61. 15 Aug 61, 20p
Contract NObsr-85506
OTS $1.60

DESCRIPTORS: *Dosimeters, Luminescence, *Phosphorescent materials, Calcium compounds, Fluorides, *Manganese, Preparation, *Computers, Design.

A study of fabrication techniques and materials for use in personnel-monitoring thermoelectric dosimeter systems was made. The information and data obtained is the basis of Phase II developmental work to be done on incorporation of Mn-activated CaF_2 phosphors into the personnel dosimeter system. (AEC abstract)

AD-283 916
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
THERMOLUMINESCENT DOSIMETER COMPUTER-INDICATOR SYSTEM. Interim engineering rept. no. 2 on Phase 2, 15 Oct 61-15 Feb 62. 21 Feb 62
Contract NObsr-85506
NP-12422
OTS $4.60

DESCRIPTORS: *Dosimeters, Luminescence, *Phosphorescent materials, Calcium compounds, Fluorides, *Manganese, *Computers, Design, Reliability.

Research within the thermoluminescent dosimeter program was directed in three main areas which may be described as follows: (1) synthesizing large (0.5 lb) batches of the CaF2:3% Mn phosphor; (2) developing the electronics of the computer-indicator to the degree of reliability and automation desired; and (3) developing the mechanical portions of the computer-indicator and dosimeter. (Author) (See also AD-283 918)

AD-425 209
EON Corp., Brooklyn, N. Y.
THE DESIGN OF AN IMPROVED PROTOTYPE GEIGER-MUELLER TUBE TO BE USED IN A STANDARD CD V-700 RADIOLOGICAL INSTRUMENT AND WHICH WILL INCREASE THE RANGE ONE DECADE. Final rept.
G. R. Weinberg, Nicholas Anton, Myron Youdin, Sidney Sturtz, and Michael Moss. [1963] 71p
Contract OCD-OS-63-33
OTS $2.00

DESCRIPTORS: *Radiation measurement systems, *Geiger counters, *Ionization chambers, Design, Construction, Life expectancy, Environmental tests.

The report presents the results of a development and engineering program leading to the successful production of 30 prototypes of a new Geiger-Mueller tube (EON Type No. 5115), designed to operate in and extend the range of the standard CD V-700 radiological instrument

AD-423 179
Naval Radiological Defense Lab., San Francisco, Calif.
TOTAL HEMISPHERICAL EMITTANCE AND NORMAL SPECTRAL EMITTANCE (λ = 0.65μ) OXIDATION PROTECTIVE COATINGS. Final rept., 27 Feb-19 Dec 62, on The Chemistry and Physics of Materials
N. J. Alvares. Jul 63, 36p
Contract MIPR 33-657-2-RD-155
ASD-TDR-63-269; N64-12663
OTS $1.00

DESCRIPTORS: *Refractory coatings, *Silicides, Refractory metals, *Molybdenum, *Tungsten, *Niobium, *Tantalum, *Corrosion inhibition, *Coatings, *Spectroscopy

Measurements of the variation of total hemispherical emittance and normal spectral emittance (λ = 0.65μ) with increasing temperatures have been made on some pack-cementation disilicide type oxidation resistant coatings for the refractory metals, molybdenum, tungsten, niobium and tantalum. The coatings tested include the Pfaudler Company's PFR-6, Chance-Vought Corporation's CV IV single and double cycle, and Chromizing Corporation's Durak-B, MG-F, and KA. The normal spectral emittance (λ = 0.65μ) of the coatings on disc samples, was determined with a micro-optical pyrometer, which was sighted into a black body hole, drilled in the sample and then onto the adjacent area. The total hemispherical emittance of the coatings on ribbon specimens was found by use of a calibrated total radiation pyrometer, which sampled the energy radiated from a uniform temperature region established about the center portion of the electrically heated ribbon specimen. The diffuseness of the surface of the various coatings was found by taking angular distributions of the radiation emitted from the center portion of the sample ribbons at various temperatures with the total radiation pyrometer. The confidence limits placed on these data are ±15 percent. (Author)

ORNL-3551
Oak Ridge National Lab., Tenn.
CORROSION OF REFRACTORY METALS BY LITHIUM
James Richard DiStefano. Master's thesis. Mar 64, 90p
Contract W7405-eng-26
OTS $2.00

PB-166 000
Pitman-Dunn [Inst. for Research] Frankford Arsenal, Philadelphia, Pa.
STUDY OF STRUCTURE AND BEHAVIOR OF COPPER AND BRASS BY PRECISION X-RAY AND HYDROSTATIC DETERMINATIONS OF DENSITY
D. J. Murphy. May 52, declassified 25 Mar 53, 107p
Rept. R-1090; AD-6144
OTS $9.10

DESCRIPTORS: *Copper, *Brass, Crystal structure, Density, X-ray diffraction analysis, Hydrostatics, Determination, *Metallography,

Lattice imperfections in copper and brass were studied by means of X-ray diffraction and hydrostatic precision density measurements. A method was developed for determining the lattice parameter of copper single crystals with high precision, and densities were calculated therefrom. Apparatus and techniques were developed for precision determinations of the density of metal specimens by hydrostatic weighing. Densities therefrom were correlated with X-ray densities. The behavior of severely cold-worked 70-30 brass upon anneal through the range of recovery, recrystallization and grain growth was studied from the standpoint of lattice imperfections by means of hydrostatic precision density measurements. (Author)

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

IS-676
Ames Lab., Iowa State Univ. of Science and Tech.
PHOTONEUTRON RESONANCES IN OXYGEN 16
James Edward Griffin and Charles L. Hammer. Feb 63, 106p
Contract W7405-eng-82
OTS $2.25

N64-18428
Enrico Fermi Inst. for Nuclear Studies, Univ. of Chicago, Ill.
THE SPACE DISTRIBUTION OF TRAPPED FISSION DEBRIS FROM THE HIGH ALTITUDE NUCLEAR TEST OF JULY 9, 1962
Raymond G. D'Arcy and Stirling A. Colgate. [1962] 15p
Grant NsG-179-61 and Contract AF19(604)4554
NASA CR-53592
OTS $1.60

Presented at the Joint NASA-DASA Symposium on the Artificial Radiation Belt, held at the Goddard Space Flight Center, Greenbelt, Md., Sep 10-11, 1962.

DESCRIPTORS: *Space environmental conditions, *Fission products, Nuclear weapons tests,

HW-77770
Hanford Atomic Products Operation, Richland, Wash.
THE HANFORD ISOTOPES PRODUCTION PLANT ENGINEERING STUDY
J. R. La Riviere, L. R. Michels, H. C. Riches, C. A. Rohrmann, and C. W. Smith. Jul 63, 126p
Contract AT(45-1)1350
OTS $2.50

DESCRIPTORS: *Radioisotopes

UCRL-11180
Lawrence Radiation Lab., Univ. of California, Berkeley.
PION-PROTON ELASTIC SCATTERING IN THE ENERGY RANGE 300 TO 700 MeV
Philip M. Ogden. Doctoral thesis. 20 Feb 64, 96p
Contract W7405-eng-48
OTS $2.25

UCRL-11143
Lawrence Radiation Lab., Univ. of California, Berkeley.
POLARIZATION OF SILVER NUCLEI IN FERROMAGNETS AND THE INTERNAL MAGNETIC FIELD
Gene A. Westenbarger. Thesis. 21 Nov 63, 101p
Contract W7405-eng-48
OTS $2.25

ANL-6649
Argonne National Lab., Ill.
FABRICATION OF UO_2-STAINLESS STEEL DISPERSION FUEL FOR BORAX-V NUCLEAR SUPERHEAT. Final rept.
W. C. Kramer and C. H. Bean. Dec 63, 72p.
Contract W31-109-eng-38.
OTS $1.75

ANL-6809
Argonne National Lab., Ill.
INTRODUCTORY FAST REACTOR PHYSICS ANALYSIS
David Meneghetti. Dec 63, 96p
Contract W31-109-eng-38
OTS $2.25

ANL-6880
Argonne National Lab., Ill.
REACTOR DEVELOPMENT PROGRAM. Progress rept. for Mar 64. 15 Apr 64, 86p
Contract W31-109-eng-38
OTS $2.00

ANL-6271
Argonne National Lab., Ill.
SAFETY ANALYSIS REPORT, ARGONNE FAST CRITICAL FACILITY (ZPR-VI)
W. Y. Kato, G. J. Fischer, and L. R. Dates. Dec 63, 270p
Contract W31-109-eng-38
OTS $3.50

CEND-190
Combustion Engineering, Inc., Windsor, Conn.
IRRADIATION TESTING OF CERAMIC FUELS. Summary rept. for 1 Oct 62-30 Sep 63.
G. Zuromsky and W. P. Chernock. Sep 63, 78p
Contract AT(30-1)2936
OTS $2.00

UCID-4506
[Lawrence Radiation Lab., Univ. of California, Livermore].
RTN #181: ROVER FUEL ELEMENT SURVEY
Eugene A. Stisser. 10 Jan 57, declassified 20 Mar 63, 6p
OTS $1.10

N64-17684
Lockheed Nuclear Products, Marietta, Ga.
EFFECT OF NUCLEAR RADIATION ON MATERIALS AT CRYOGENIC TEMPERATURES. Quarterly progress rept. no. 12, Oct-Dec 63
C. A. Schwanbeck. 1963, 36p
Contract NASw-114
ER-6793; NASA CR-56004
OTS $3.60

DESCRIPTORS: Metals, *Radiation effects, *Cryogenics.

ORNL-3535
Oak Ridge National Lab., Tenn.
ANALYSIS OF SIMPLY SUPPORTED GRIDS OF PERPENDICULAR BEAMS
F. J. Witt. Mar 64, 41p
Contract W7405-eng-26
OTS $1.00

ORNL-3503
Oak Ridge National Lab., Tenn.
DESIGN AND THERMAL ANALYSIS OF EGCR CONTROL RODS
J. W. Michel. Mar 64, 54p
Contract W7405-eng-26
OTS $1.50

ORNL-3542
Oak Ridge National Lab., Tenn.
EFFECTS OF TEMPERATURE ON FISSION-PRODUCT DEPOSITION
M. N. Ozisik. Mar 64, 26p
Contract W7405-eng-26
OTS $0.75

ORNL-3555
Oak Ridge National Lab., Tenn.
AN EXPERIMENTAL INVESTIGATION OF INSTANTANEOUS-COLLAPSE AND CREEP-BUCKLING CHARACTERISTICS OF CYLINDRICAL SHELLS
B. L. Greenstreet and J. M. Corum. Mar 64, 42p
Contract W7405-eng-26
OTS $1.00

ORNL-3547
Oak Ridge National Lab., Tenn.
NUCLEAR SAFETY PROGRAM. Semiannual progress rept. for period ending 31 Dec 63. Mar 64, 88p
Contract W7405-eng-26
OTS $2.00

PHYSICS

IS-762
Ames Lab., Iowa State Univ. of Science and Tech.
THE FERMI SURFACE OF LEAD
James Robert Anderson and A. V. Gold. Nov 62, 237p
Contract W7405-eng-82
OTS $3.00

DESCRIPTORS: *Lead

NASA-TN-D-2235
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SPUTTERING AT OBLIQUE ANGLES OF ION INCIDENCE
Thomas W. Snouse. Apr 64, 27p
N64-18080
OTS $0.75

DESCRIPTORS: *Sputtering, *Ion bombardment.

AD-422 442
Naval Ordnance Lab., White Oak, Md.
ON THE ORGIN OF SHOCK WAVES FROM CONDENSED EXPLOSIONS IN AIR. PART 2: MEASUREMENTS OF AIRSHOCK PRESSURES FROM 8-LB TNT SPHERES OF VARIOUS DENSITIES AT AMBIENT PRESSURES
L. Rudlin. 21 Jan 63, 86p
NOLTR-63-13; DASA-1360; N64-12261
OTS $2.25

by one decade. OCD classification for this general detector is OCD-D-101. A definitive specification for this tube was evolved and the prototypes were evaluated in accordance with this specification. In addition the prototype tubes were subjected to extensive active and shelf life tests to prove their feasibility for application in the referenced equipment. (Author)

HW-SA-2932
Hanford Atomic Products Operation, Richland, Calif.
LOW LEVEL GAMMA SPECTROMETRY USING BETA-GAMMA COINCIDENCE
F. P. Brauer and R. E. Connally. [12 Jun 63] 17p
Contract AT(45-1)1350
CONF-39-23
OTS $1.60

DESCRIPTORS: *Scintillation counters, *Nuclear radiation spectrometers

American Nuclear Society Meeting, Salt Lake City, Utah, Jun 63

UCRL-10652
Lawrence Radiation Lab., Univ. of California, Berkeley.
BEVATRON OPERATION AND DEVELOPMENT. NO. 36
Rept. for Oct-Dec 62
Kenneth C. Crebbin and Rudin M. Johnson. 16 Dec 63, 26p
Contract W7405-eng-48
OTS $0.75

UCRL-10863
Lawrence Radiation Lab., Univ. of California, Berkeley.
BEVATRON OPERATION AND DEVELOPMENT. 37
Rept. for Jan-Mar 63
Kenneth C. Crebbin, Rudin M. Johnson, and William L. Everette. 13 Feb 64, 23p
Contract W7405-eng-48
OTS $0.50

UCRL-11300
Lawrence Radiation Lab., Univ. of California, Berkeley.
NEUTRON AND ALPHA COUNTERS FOR HEAVY-ELEMENT COLUMN CHEMISTRY
Robert J. Walker, Tommy R. Corbin, and James T. Haley. 18 Feb 64, 10p
Contract W7405-eng-48
OTS $0.50

AD-423 701
Lionel Electronic Labs, Inc., Brooklyn, N. Y.
REMOTE READING RATEMETER FOR FALLOUT SHELTERS. Final rept. Jul 63, 72p
Contract OCD-OS-62-272
OTS $2.00

DESCRIPTORS: *Radiation measurement systems, *Gamma counters, *Ionization chambers, Meters, Remote control, Circuits, Packaging, *Electric cables, Electric insulation, Environmental tests, Instruction manuals, Costs, Manufacturing methods, Shelters.

Evaluation was made in detail of several possible systems for each of the major sub-assemblies (the readout and power supply unit, the detector and detector housing and the interconnecting cable) for a remote indicating gamma ratemeter. The readout and power supply unit were considered both electrically and mechanically to determine the best possible system of measurement, as well as the most practical method of construction and the best form factor. In the detector, and detector housing, primary emphasis was placed on ionization chamber performance and the mechanical ruggedness of its housing. Various cables and insulating materials were evaluated to determine their suitability in an application of this type. (Author)

ORNL-3505
Oak Ridge National Lab., Tenn.
MEASUREMENT OF THE INTENSITY OF THE PROTON BEAM OF THE HARVARD UNIVERSITY SYNCHROCYCLOTRON FOR ENERGY-SPECTRAL MEASUREMENTS OF NUCLEAR SECONDARIES
R. T. Santoro and R. W. Peelle. Mar 64, 54p
Contract W7405-eng-26
NASA Order nos. T-7632 and R-104
OTS $1.50

AD-280 434
School of Aerospace Medicine, Brooks AFB, Tex.
THE USE OF POWDERED ALANINE AS A SOLID DOSIMETER
G. W. Crawford, H. A. W. Spetzler, W. W. Bradshaw, and D. G. Cadena, Jr. (Southwest Research Inst.)
9 Aug 61, 8p
Rept. no. 62-23
OTS $1.10

DESCRIPTORS: *Dosimeters, *Amino acids, Propionic acid, Powders, *Nuclear magnetic resonance, Containers, Glass, Plastics, Radiation chemistry, Gamma rays, X rays, Protons, Beta particles, Spectroscopy, Signal-to-noise ratio.

Powdered dl-alanine was fabricated to form solid state dosimeters. The irradiated powder was found to be stable with no measurable change in the number of free radicals created 14 days after irradiation and only a 5 percent decay 90 days after irradiation. Plastic and glass specimen holders for the ESR unit were used as part of a search for a holder giving the best signal-to-noise ratio. Preliminary experimental results with an accuracy of ± 5 percent were obtained for gamma irradiated dosimeters between 100 to 100,000 r, beta irradiated dosimeters between 100 to 20,000 rads, proton irradiated dosimeters between 250 to 2,000 rads, and x-ray irradiated dosimeters between 1,000 to 20,000 r. The data were plotted as the relative ESR intensity in arbitrary units versus dose for the various radiations. (Author)

Nuclear Engineering and Power

IS-760
Ames Lab., Iowa State Univ. of Science and Tech.
ENGINEERING DESIGN CONSIDERATIONS FOR A LIQUID-METAL IN-PILE LOOP
David Henry Thompson, Glenn Murphy, and Ray W. Fisher. Nov 63, 85p
Contract W7405-eng-82
OTS $2.00

NASA-TN-D-2273
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
FREQUENCY RANGES FOR EXISTENCE OF WAVES IN A COLD, COLLISIONLESS HYDROGEN PLASMA
Richard R. Woollett. Apr 64, 31p
N64-18737
OTS $0.75

DESCRIPTORS: Hydrogen, *Plasma physics, *Electromagnetic waves.

AD-423 378
Physical Electronics Research Lab., Univ. of Minnesota, Minneapolis.
RESEARCH IN PHYSICS OF ELECTRON EMISSION AND ELECTRON TUBE TECHNOLOGY. Interim rept. no. 2, 16 Apr-15 Oct 63
D. E. Anderson and W. T. Peria, ed. [1963] 345p
Contract AF33(657)10475
OTS $5.00

DESCRIPTORS: *Electron tubes, *Semiconductors, Electrons, *Secondary emission, Single crystals, Thin films, *Tunnel diodes, Triodes, *Thermionic emission, Cathodes (Electron tubes), *Germanium, Sodium, Electron diffraction analysis, Electron bombardment, *Antimonides, *Photoelectric effect, *Superconductors

Contents: Basic studies of secondary electron emission (the variation of secondary electron emission from single crystals with the angle of incidence of the primary electron beam, transmission of electrons through thin gold films, theory of the production process for secondary electrons); studies of practical dynodes (Al_2O_3 films, MgO films, Fe_2O_3 strip multiplier); multilayer thin-film tunnel devices; (studies of thin-film diodes and triodes, electron emission from thin-film diodes); Studies of thermionic emitters (optical measurements of oxide cathodes, controlled activation and deactivation of cathodes, thickness dependence of properties of the oxide cathode, studies of barium sulfide and barium-strontium sulfide cathodes); influence of adsorbed alkali on the surface properties of semiconductors (the dependence of the work function of Ge on the Na coverage, secondary emission studies on Ge and Na-covered Ge, field emission microscopy); surface cleaning studies (slow-electron diffraction study of the MgO surface, slow-electron diffraction study of the CdF_2 surface, desorption of gases by electron bombardment, application of quantum-mechanical time-dependent perturbation theory to the electron diffraction problem); studies of the alkali antimonides, (Na_3Sb films, bulk Na_3Sb); studies of the anomalous photovoltaic effect (comparison of sputtered and evaporated Ge films); electron emission from superconductors (enhanced emission from superconducting field emitters, extraction of electrons from superconducting films). (See also AD-415 352)

AD-434 329
Rome Air Development Center, Griffiss AFB, N. Y.
PHYSICS OF FAILURE IN ELECTRONICS, VOLUME 2. ANNUAL SYMPOSIUM NO. 2 HELD IN CHICAGO, 25-26 SEPTEMBER 1963
Joseph Vaccaro and M. F. Goldberg, ed. (IIT research Inst.). [1963] 571p
OTS $7.00

DESCRIPTORS: *Electronic equipment, Failure (Mechanics), *Symposia, *Reliability (Electronics), Resistors, Metal films, Aging (Materials), Capacitors, Mathematical prediction, Transistors, Stresses, Diodes (Semiconductor), Noise (Radio), Silicon, Germanium, Traveling wave tubes, Miniature electronic equipment, Tunnel diodes, Lasers,

Contents:
Analysis of requirements in reliability physics, by A. L. Tamburrino
Research toward a physics of aging of electronic component parts, by R. E. Thomas and H. C. Gorton
Derivation of Delbruck's model for random failure (for semiconductor materials): its identification with the Arrhenius model; and its experimental verification, by A. V. Pershing and G. E. Hollingsworth
Comprehensive failure mechanism theory-metal film resistor behavior, by M. Goldberg, A. Horberg, R. Stewart, and D. Levinson
Stress-strength theory and its transformation into reliability functions, by B. Tiger and K. Weir
Diffusion studies on stressed tantalum-tantalum oxide capacitors, by N. Johnson and K. Greenough
Solid-state thermal diffusion: a contributor to degradation of semiconductor junction devices, by M. C. Johnson
Failure mechanism in silicon, by J. E. Mann and N. P. Sandler
Some failure mechanisms at insulator-conductor junctions, by G. A. Shirn and D. M. Smyth
Silicon transistor failure mechanisms caused by surface charge separation, by E. David Metz
A fundamental failure mechanism in thin film metal-dielectric structures observable as a generated voltage, by J. J. Wortman and R. M. Burger
Failure physics and accelerated testing, by G. Bretts, J. Kozol, and H. Lampert
On the extrapolation of accelerated stress conditions to normal stress conditions of germanium transistors, by J. Partridge
Prediction of functional electronic block performance through localization of malfunctions, by W. J. Lytle, J. W. Merck, J. W. Dzimianski, and S. M. Skinner
Application of the electron microprobe analyzer to the study of silicon switching diodes, by P. Pietrokowsky
Burst noise in semiconductor devices, by W. H. Card and A. Mavretic
Localized thermal effects in silicon power transistors, by R. M. Scarlett and W. Schroen
Failure mechanisms in semiconductors, by H. S. Dodge
On the degradation of gallium arsenide tunnel diodes, by R. L. Anderson
The aging mechanisms of metal film resistors, by J. J. Bohrer and C. W. Lewis
Failure mechanisms in traveling-wave tubes, by R. A. Hein and J. S. Needle
Thermodynamics of failure and aging, by M. Ruderfer
Application of flowgraph techniques to the solution of reliability problems, by W. W. Happ
Identification and elimination of a failure mechanism in semiconductor devices, by T. A. Longo and B. Selikson
Reliability of gaseous optical masers using noble gas active media, by J. E. Taylor
Silicon surface passivation: materials and micro properties, by J. W. Dzimianski, E. R. Pemsel, W. J. Lytle, and S. M. Skinner
Missile failure due to impurities in electroplates, by P. Mahler
Stacking faults and failure of silicon devices, by H. J. Queisser

DESCRIPTORS: *TNT, *Explosion effects, *Air blast, *Shock waves, Pressure, Measurement

Airshock pressures were measured over the range from about 80 to 2 psi from about 25 TNT spheres of density ranging from about 1.01 to 1.625 gm/cm^3. The purpose of these experiments was to examine the validity of some of the concepts assumed to hold in the use of cube-root scaling procedures. The results indicate that the airshock peak pressures and the pressure-time signatures do not depend on the calculated detonation variables of the various density spheres. Instead, the airshock pressure depends only on the energy released by the explosion, verifying a basic assumption of the cube-root procedure. (Author) (See also AD-414 637)

AD-407 553
Oklahoma Univ. Research Inst., Norman.
ELECTRICALLY ENERGIZED SHOCK TUBES. Technical rept. no. 19 (Final).
Richard G. Fowler. 1963, 168p
Contract Nonr-98202
N63-17432
OTS $12.00

DESCRIPTORS: *Shock tubes, Gas discharges, *Plasma physics, Shock waves, Fluid mechanics, Design, Theory, Gas ionization, Electromagnetic waves, Instrumentation, Fluid flow, Fluid dynamic properties, Heat transfer, Spectroscopy, Boundary layer, Boundary layer transitions, Plasma sheath, Magnetohydrodynamics, Exploding wires, Magnetic pinch, Surfaces, Velocity, Surface properties, Electric discharges.

Contents:
Nature and history of electrical-driven shock waves
Equipment and diagnostic techniques
Electrical behavior of gases in the driver discharge
Electron-driven plasma shock waves
Breakdown waves, precursors and electron fluid dynamics
Radiation studies
Interactions
Diffusion, and magnetic insulation in the electrical shock tube
Ideal electrical shock tube design
Electrical properties of the flowing plasma
Miscellaneous observations
Molecular averages
Shock and contact surface velocities
Balmer continum emission data
Energy requirements of gases at 1 MM HG
(See also PB-157 178)

Acoustics

NASA-TN-D-2266
Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
REVIEW OF SOME RECENT RESEARCH ON NOISE AND STRUCTURAL VIBRATION
R. H. Lyon and G. Maidanik. Apr 64, 54p
Contract NA[illegible]-47
N64-18959
OTS $1.50

DESCRIPTORS: *Noise, Structures, *Vibration.

SC-4454(RR)
Sandia Corp., Albuquerque, N. Mex.
MATHEMATICAL ASPECTS OF THE PROBLEM OF ACOUSTIC WAVES IN A PLANE STRATIFIED MEDIUM
G. Milton Wing. Sep 60, 24p
OTS $2.60

Electronics

AD-282 877
David Sarnoff Research Center, Princeton, N. J.
RESEARCH IN ELECTRON EMISSION FOR SEMICONDUCTORS. Quarterly rept. no. 7 (Rept. no. 15), 1 Apr-30 Jun 62
R. E. Simon, W. H. McCarroll, W. E. Spicer, E. K. Gatchell, and C. R. Fuselier. [1962] 34p
Contracts DA36-039-sc-87388 and DA35-039-sc-78155, continuation
OTS $3.60

DESCRIPTORS: *Thermionic emission, *Semiconductors, Argon, Ions, Ion bombardment, Silicon, Cesium, Tungsten, Adsorption, Alkali metals, Photoemission, Photoelectrons,

The results of argon ion bombardment of silicon p-n junction emitters are reported. A large increase in emission is found as a result of the bombardment. An emitter with an injecting contact has been fabricated. Experiments in which enhanced light emission has been observed are reported. An analysis of data on the adsorption of cesium on tungsten and silicon is presented. A method of obtaining information on the band structure of semiconductors from photoemission measurements is described. (See also AD-275 930)

AD-423 372
IIT Research Inst., Chicago, Ill.
EXCESS NOISE IN SEMICONDUCTORS. Annual summary rept. no. 8, 15 Nov 62-14 Nov 63
James J. Brophy. 4 Nov 63, 57p
Contract Nonr-1800(00)
ARF Proj. no. 1066-4
OTS $1.50

DESCRIPTORS: *Semiconductors, *Noise (Radio), Oscillation, *Single crystals, Impurities, *Germanium, Infrared radiation, Absorption, Noise analyzers

The random spatial distribution of impurity atoms near a semiconductor p-n junction is examined experimentally by causing the space charge region of the junction to sweep through the distribution under a periodic reverse bias potential. The observed noise current spectrum is in reasonable agreement with the results of an analytical treatment based on a Poisson distribution except that some tendency for clustering of impurity atoms is suggested. Experiments to measure fluctuations in the optical absorption of germanium caused by random free carrier fluctuations associated with 1/f noise have shown that the effect is observable by increasing the strength of the transmitted infrared beam or by improving the detectivity of the infrared detector. The strength of the infrared beam is determined directly from noise measurements on the detector itself. (See also AD-288 874).

Program efforts aimed at continuous (CW) operation of sun-powered laser transmitter are described. General conditions are given for CW operation of material with many overlapping levels and refractive index > 1. Figure of merit "G" (enables determination of threshold for lossless material) is defined and data for numerically integrating "G" of sun-powered, end-pumped ruby (3-level) laser are presented. A design for the latter system is described and associated heat problems and possible solutions are discussed. Laboratory pump sources developed and laboratory studies performed (threshold vs. various ruby laser parameters, and other measurements) are discussed. Measured threshold appears 3X > calculated value for lossless material. Rate equations for 4-level systems and "qualified" solutions are also set down. (Author)

PB-165 339
Bausch and Lomb, Inc., Rochester, N. Y.
OPTICAL PROPERTIES OF MULTILAYER FILMS AND INTERFERENCE FILTERS IN THE 10 MICRON REGION. Quarterly technical rept. no. 5, 23 Apr-22 Jul 51
A. Francis Turner 18 Feb 52, 52p
Contract DA44-009-eng-18
ATI-139 373
OTS $5.60

DESCRIPTORS: Interference, *Filters (Electromagnetic wave), *Infrared filters, Films, *Dielectric films, Optical properties, Graphics.

The report reviews the film requirements for interference filters, presents some of the optical characteristics of the filters and outlines computational methods. Performance predictions for the infrared must await relevant and optical data on the film materials in this region. However, some numerical examples are given on the basis of available optical film data in the visible to indicate, at least, what may be expected from all-dielectric interference filters made for the 10 micron region.

ORNL-3485
Oak Ridge National Lab., Tenn.
THE ANGULAR AND SPECTRAL DISTRIBUTIONS OF LIGHT EMITTED FROM ELECTRON-BOMBARDED SILVER FOILS
Norma O. Davis, E. T. Arakawa, L. C. Emerson, and R. D. Birkoff. Master's thesis. Mar 64, 70p
Contract W7405-eng-26
OTS $1.75

PB-165 876
Picatinny Arsenal, Dover, N. J.
AN INVESTIGATION INTO THE FEASIBILITY OF A PYROTECHNIC LASER PUMP
Chester L. Smith and Paul J. Kisatsky. Aug 63, 63p
Technical rept. 3102; N63-22216
OTS $6.60

DESCRIPTORS: *Pyrotechnics, *Lasers, *Pumping (Electronics), Fuels, Oxidizers, Explosive materials, Optical properties, Feasibility studies,

The initial objectives were established as follows: (1) Determine pump requirements of solid state laser media; (2) determine to what extent presently existing pyrotechnic and other sources meet these requirements; (3) initiate development of items and systems to produce an effective means of pumping; and (4) to demonstrate feasibility of pumping with relatively small pyrotechnic items. Pyrotechnic compositions consisting of two basic ingredients - fuels and oxidizers - were tested in various combinations. Combinations of pyrotechnic ingredients and high explosives were also examined and high explosives in various configurations were tested. (Author)

N64-18422
Westinghouse Electric Corp., Baltimore, Md.
OPTICAL SYSTEMS STUDY. Monthly progress letter no. 10, 20 Feb-20 Mar 64
30 Mar 64, 6p
Contract NASw-703
NASA-CR-53564
OTS $1.10

DESCRIPTORS: *Optical equipment.

Solid State Physics

N64-18301
Laboratories for Applied Sciences, Univ. of Chicago, Ill.
QUANTUM EFFICIENCY OF SILICON IN THE VACUUM ULTRAVIOLET
A. J. Tuzzolino. [1962] 8p
Grant NsG-179-61
NASA CR-53104
OTS $1.10

DESCRIPTORS: *Silicon, *Diodes (Semiconductor),

NASA-TN-D-2275
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
SURFACE TOPOGRAPHY OF SINGLE CRYSTALS OF FACE-CENTERED-CUBIC, BODY-CENTERED-CUBIC, SODIUM CHLORIDE, DIAMOND, AND ZINC-BLENDE STRUCTURES
Robert J. Bacigalupi. Apr 64, 77p
N64-18960
OTS $2.00

DESCRIPTORS: *Single crystals, Crystal structure.

NASA-CR-40
Radio Corp. of America, Camden, N. J.
PROTON DAMAGE IN SEMICONDUCTOR DEVICES. Final rept., 16 Apr-1 Nov 62
D. M. Arnold, J. A. Baicker, H. Flicker, D. A. Gandolfo, and J. R. Parker. Apr 64, 73p
Contract NAS1-1654
N64-18952
OTS $2.00

DESCRIPTORS: *Semiconductor devices, *Protons, Radiation damage,

Failure modes and mechanisms in solid tantalum capacitors, by E. J. Fresia and J. M. Eckfeldt
Failure modes in integrated and partially integrated microelectronic circuits, by G. P. Anderson and R. A. Erickson
Observations of the physics of failure of semiconductor devices by x-ray radiography, by R. L. Silver
Failure modes in naval electronic equipment, by J. H. Brun
Important mechanism contributing to tunnel diode failure, by R. P. Nanavati

PB-165 634
Stanford Electronics Labs., Stanford Univ., Calif.
MAGNETIC DEFLECTION FOCUSING. Topical rept.
P. A. Sturrock (Microwave Lab., Stanford Univ.)
May 59, 15p.
Contract DA36-039-sc-73178
SEL Technical rept. no. 901-3; ML rept. no. 595;
AD-219 478
OTS $1.60

DESCRIPTORS: *Electron beams, Deflection, *Focusing, Magnetic fields, Configuration, Space charges, Equations, Microwave equipment.

A scheme for focusing sheet beams by means of a periodic configuration of magnetic fields directed transverse to the beam is presented. Discussion of a particular model gives information about stability limits and perveance. This scheme, which lends itself to the incorporation of intense magnetic fields, should be immune to the space-charge instabilities of beams focused in longitudinal magnetic fields. The focusing mechanism is such as to produce coupling between the beam and electromagnetic waves of phase velocity exceeding the velocity of light. Application to millimeter-wave tubes is anticipated. (Author) (See also PB-155 019)

PB-165 633
Stanford Electronics Labs., Stanford Univ., Calif.
PERIODIC MAGNETIC DEFLECTION FOCUSING. Topical rept.
L. W. Davis. (Microwave Lab., Stanford Univ.)
Feb 59, 38p
Contract DA36-039-sc-73178
SEL Technical rept. no. 901-1; ML rept. no. 570;
AD-215 905
OTS $3.60

DESCRIPTORS: *Electron beams, Magnetic properties, Deflection, *Focusing, Motion, Equations.

Investigation was concerned with a theoretical treatment of a focusing system designed to produce a sheet electron beam of high-current density. The beam described has properties which can best be described in terms of a Cartesian coordinate system. The mean direction of travel of the electrons is in the z-direction; the beam is invariant in the y-direction; and it is thin in the x-direction. It is assumed that the beam is symmetric about the plane $x = 0$. It is further assumed that the current density has the following dependence upon x: at any plane of constant z, the current density is constant within the beam and zero outside of the beam. The focusing system is periodic in z with period L, meaning that any property of the focusing system is identical at planes of constant z spaced a distance nL away from each other, n being an integer, or, we write at planes $z = \text{constant} \pmod{L}$. It is shown that, if the beam is injected correctly, the current density will be periodic in z, with a period half that of the focusing system. (Author)

PB-165 635
Stanford Electronics Labs., Stanford Univ., Calif.
THEORY OF THE FOCUSING OF SHEET BEAMS IN PERIODIC FIELDS. Topical rept.
P. A. Sturrock (Microwave Lab., Stanford Univ.)
May 59, 20p.
Contract DA36-039-sc-73178
Technical rept. no. 901-4; ML rept. no. 596;
AD-219 479
OTS $1.60

DESCRIPTORS: *Electron beams, *Focusing, Laminar flow, Space charges, Stability, Equations, Mathematical analysis.

Equations determining the paraxial behavior of sheet beams in periodic focusing fields are established. Space-charge is taken into account, and its effect upon stability is investigated. Results show that, if space-charge is neglected, any such focusing system is convergent. A procedure for determining optimum lamellar-flow configurations is set out, and approximate formulas for the perveance of such focusing systems are presented. (Author) (See also PB-165 634)

Molecular Physics and Spectroscopy

N64-18455
Alabama Univ. Research Inst., Huntsville.
THE MATHEMATICAL ANALYSIS OF LATTICE BOUNDARY VALUE PROBLEMS APPLIED TO MOLECULAR COLLISIONS WITH SURFACES
C. M. Chambers, Jr., and E. T. Kinzer, Jr. Feb 64, 52p
Grant NsG-381
UARI-RR-9; NASA CR-53577
OTS $5.60

DESCRIPTORS: *Boundary value problems, *Molecules

NASA-TN-D-2250
Johns Hopkins U., Baltimore, Md.
INSTRUMENTATION FOR FAR ULTRAVIOLET ROCKET SPECTROPHOTOMETRY
William G. Fastie. Apr 64, 25p
Grant NsG-193-62
N64-17992
OTS $0.75

DESCRIPTORS: Upper atmosphere, *Ultraviolet spectrophotometers.

Optics

AD-292 146
American Optical Co., Southbridge, Mass.
INVESTIGATION AND DEVELOPMENT OF A SUN-POWERED LASER TRANSMITTER. Final rept.
E. O. Dixon. Oct 62, 175p
Contract AF33(616)8025
Rept. no. AOER 2-03; ASD-TDR-62-447
OTS $12.50

DESCRIPTORS: *Lasers, *Solar energy, Optics, Refraction, Transmitter receivers, Ruby, Communication systems, Design.

SOCIAL SCIENCES

Documentation

AD-273 115
Andersen (Arthur) and Co., New York.
RESEARCH STUDY OF CRITERIA AND PROCEDURES FOR EVALUATING SCIENTIFIC INFORMATION RETRIEVAL SYSTEMS. Final rept. Mar 62, 169p
Contract NSF-C218
OTS $12.00

DESCRIPTORS: *Information retrieval, *Documentation, *Data storage systems, Models (Simulation), *Computers, Costs, Time, Volume

The study deals with the requirements, criteria, and measures of performance which might be used to evaluate and compare scientific information retrieval systems. A review of existing literature indicated that useful contributions might be made with respect to both cost measurements and system simulations. A cost-time-volume model was conceived, detailed by stage and tested. Following the simulation approach an information retrieval system performance simulator was developed and applied. Simulation is feasible and useful for comparing systems. Both evaluation models are based upon the conclusion that all scientific information retrieval systems are comprised of four basic stages: coding and indexing of objects for storage; coding of inquiries in a language consistent with that applied to objects; matching inquiries with objects in accordance with system-imposed rules; and user appraisal of retrieved objects. In general, these stages can be represented abstractly in binary language within a matrix of stored objects and indexing terms. (Author)

N64-17582
Coordinated Science Lab., Univ. of Illinois, Urbana.
THEORETICAL AND EXPERIMENTAL STUDIES OF THE UNDERLYING PROCESSES AND TECHNIQUES OF LOW PRESSURE MEASUREMENT. Final rept.
D. Alpert. 31 Jan 64, 21p
Grant NsG-376
NASA CR-53198
OTS $2.60

DESCRIPTORS: *Low-pressure research,

AD-406 365
David Sarnoff Research Center, Princeton, N. J.
STUDY OF SPEECH COMPRESSION SYSTEMS (SYLLABIC COMPRESSION TECHNIQUES). Quarterly progress rept. no. 2, 16 Jul-15 Oct 62
H. Belar and E. S. Rogers. 15 Oct 62, 92p
Contract DA36-039-sc-89191
OTS $8.60

DESCRIPTORS: *Speech compression, Speech representation, *Voice communication systems, Speech, Speech recognition, Processing, Analysis, Vocabulary, Synthesis, Intelligibility, Statistical data.

A limited and rudimentary speech processing system developed by the RCA Laboratories is the starting point of this research. It provides a syllable communications system voice-to-print, or voice-to-voice, over a channel of only 6 bits per word for a 50 word vocabulary. The processing of the spoken word is performed by a coarse structure, anplitude comparing and time compensated analyzer. Tests were made with apparatus for analyzing and the printing of the quantized speech pattern, using a list of words proposed by the Voice Security Branch of the USASRDL, with the aim to increase the resolving power, etc. Studies of envelope characteristics were continued. Additional tests were made of the rate of growth, rate of decay and the characteristics of intrasyllable pauses, and some earlier results confirmed. Preliminary work toward increasing the resolving power for fricative consonant is described. (Author)

PB-165 306
Institute for Cooperative Research, Univ. of Pennsylvania, Philadelphia.
ON RETRIEVAL IN AID OF SCIENTIFIC DISCOVERY
John O'Connor [1960] 26p
[Contract Nonr-551(35)]
AD-245 919
OTS $2.60

DESCRIPTORS: *Information retrieval, Reports, *Documentation, *Data processing systems, Design.

The following question is discussed: what should a good retrieval system do, if considerations of cost and technical feasibility can be neglected in judging how good the system is. The special case of retrieval to aid scientific discovery is considered. (DDC abstract)

OTS SB-533
Office of Technical Services, Dept. of Commerce, Washington, D. C.
SCIENCE AND TECHNOLOGY. PART IV: PL-480 TRANSLATION PROGRAM. Feb 64, 19p
OTS Selective Bibliography SB-533
OTS $0.10

DESCRIPTORS: *Bibliographies, Chemistry, Engineering, Machines, Materials, Mechanics, Metallurgy, Nuclear physics, Mathematics, *Scientific research

Lists 322 translations financed with currencies accrued in Israel, Poland and Yugoslavia as a result of sale abroad of American surplus agricultural commodities. Material selected by scientists of U. S. agencies participating in this program. Subjects are arranged in the following categories: Chemistry; Engineering; Machinery; Materials; Mechanics; Metallurgy; Nuclear Physics and Nuclear Chemistry; Physics and Mathematics; Patents. Most of these translations are available through OTS for about a penny a page.

Thermodynamics

IS-810
Ames Lab., Iowa State Univ. of Science and Tech.
PEAK HEAT FLUX IN NUCLEATE BOILING TRANSFER
Bernard P. Breen and George Burnet. Jan 64, 48p
Contract W7405-eng-82
OTS $1.50

DESCRIPTORS: *Boiling, Thermocouples, *Heat transfer

AD-433 587 repriced
Rensselaer Polytechnic Inst., Troy, N. Y.
PROBABLE INTERFACE TEMPERATURES OF SOLIDS IN SLIDING CONTACT. Rept. for 1 May-31 Aug 63, on Fundamental Research on Macromolecular Materials and Lubrication Phenomena
F. F. Ling and S. L. Pu. Feb 64, 29p
Contract AF33(657)10058
RTD-TDR-63-4184
OTS $0.75

DESCRIPTORS: Solids, Surface temperatures, Friction, *Heat transfer, Equations, *Stochastic processes,

Typical time dependent, surface temperature distribution obtained by indirect measurement is presented. Also presented are area averaged temperature jump data at the interface jfor high Peclet number; the jump is associated with macroscopic thermal resistance mechanism across the interface. Moreover, a simple stochastic model is introduced to show that, whereas the measurable temperature far away from the interface may be smooth functions with respect to distance from the interface, the surface temperature will always be fluctuating and the magnitude of these temperature flashes are shown. (Author)

Wave Propagation

AD-425 083
Army Electronics Research and Development [Agency] Fort Monmouth, N. J.
TRANSMISSION LINE FORMULATION FOR OPTICAL MASER AMPLIFICATION
H. Jacobs, D. A. Holmes, L. Hatkin, and F. A. Brand. Nov 63, 36p
USAELRDL Technical rept. 2402
OTS $1.00

DESCRIPTORS: *Lasers, Masers, *Transmission lines, *Electromagnetic waves, Propagation, Oscillation, Gain, Amplifiers, Attenuation, Impedance matching.

The optical maser amplifier is treated from the point of view of distributed lines. Transmission line analogues are set up generally for a system consisting of air, reflector, active medium, reflector and air again. It is postulated that in the active medium the growth of the wave can be looked upon as due to the presence of an effective negative conductivity. The problem is discussed for one medium (active material); three media, air, ruby, air, and the five media case. Calculations are carried out showing that the five layer case for special conditions can be reduced to a three layer case. Equations for amplification and oscillation are developed which give the same results as Maiman's criteria for oscillation and Smiley's Fabry-Perot analysis for gain. The effective length of the line is estimated and one dimensional wave propagation is justified on the basis of the small spreading angle. Some of the more recent predictions of gain as a function of length and negative attenuation factor are explained in terms of the impedence matching of an electromagnetic wave in air to the impedance seen at the front surface of the crystal. (Author)

AD-291 569
Space Sciences Lab., General Electric Co., Philadelphia, Pa.
MICROWAVE REFLECTION BY NON-UNIFORM PLASMA WITH EXPONENTIAL ELECTRON DISTRIBUTION. Technical rept. no. 20
K. T. Yen. Nov 62, 11p.
Contract AF30(602)1968
Rept. no. R62SD47; RADC-TDR-62-433; N63-15026
OTS $1.60

DESCRIPTORS: *Plasma sheath, *Electromagnetic wave reflections, *Microwaves, Wave transmission, Electrons, Density, Field theory, Atmosphere entry.

Microwave reflection by non-uniform plasmas with an exponential electron distribution which approaches an equilibrium value far downstream is considered. Several approximate formulas for the reflection coefficient and phase-shift angle are presented. Some numerical calculations have been carried out, and the results are presented in graphs. Comparison of the present results with those for ramped electron distributions shows an interesting point; i.e., when piecewise linear segments are used to represent a continuous electron distribution, the wave interactions thus produced may have significant effects for the reflection and transmission of electromagnetic waves. (Author) (See also AD-294 981)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

AD-424 891
Aerospace Medical Research Labs. (6570th), Aerospace Medical Div., Wright-Patterson AFB, Ohio.
BIBLIOGRAPHY OF RESEARCH REPORTS AND PUBLICATIONS ISSUED BY THE BIODYNAMICS AND BIONICS DIVISION Jun 63, 52p
N63-22348
OTS $1.50

DESCRIPTORS: *Bibliographies, *Bionics, *Noise, *Sound, *Hearing, *Ear, Speech, Psychoacoustics, Vibration

Contents:
Sound sources and noise fields
Sound propagation
Instrumentation
Noise control - general
Noise control structures
Hearing and physiology of the ear
Speech
Biological and psychological effects of noise and sound
Ear protection
Mechanical characteristics of the human body, effects of vibrations and shocks
General noise guides and criteris, and bion Bionics

AD-406 155
TRW Computers [Co.] Canoga Park, Calif.
AUTOMATIC ABSTRACTING. Final rept.
H. P. Edmundson. 2 Feb 63, 91p
Contract AF30(602)2223
Rept. no. C107-3U1; RADC-TDR-63-93
OTS $8.60

DESCRIPTORS: Automatic, *Abstracting, *Information retrieval, *Computers, *Programming (Computers), Documentation, Data processing systems, Tests, Experimental data,

An operating system and a research methodology are presented. The operating system produces automatic abstracts via programs written for the IBM 7090 and the IBM 1401. The programming involved the preparation of an Edit Program which inputs the text of documents, a Cue Dictionary Program which inputs a fixed word list, and an Abstracting Program which selects and outputs sentences of the document. The research methodology proceeds from linguistic analysis of documents comprising a sample library, the compilation of dictionaries, the formulation of abstracting rules which are applied to new documents of an experimental library, and concludes with testing and evaluation of the final program and dictionaries on documents of a test library. Examples are given of abstracts produced by the four basic methods: Cue method, Key method, Title method, and Location method. (Author)

AD-410 245
Raytheon Co., Waltham, Mass.
PERTEACH (PERT FUNDAMENTA .S, VOLUME 1)
[1963] 262p
Contract AF19(628)365
ESD-TDR-63-198, Vol. 1
OTS $17.00

DESCRIPTORS: *Management engineering, *Decision making, Control systems, Programming (Computers), *Instruction manuals,

The self-instructional course teaches the basic concepts and techniques of PERT (Program Evaluation Review Technique). The course consists of six volumes and is intended for use by Air Force managers. Presented in programed-instruction format, the course allows the student to proceed at his own pace and to learn without the aid of an instructor. (Author)

AD-410 273
Raytheon Co., Waltham, Mass.
PERTEACH (PERT FUNDAMENTALS, VOLUME II).
[1963] 247p
Contract AF19(628)365
ESD-TDR-63-198, Vol. II
OTS $16.00

DESCRIPTORS: *Management engineering, *Decision making, Control systems, Programming (Computers), *Instruction manuals,

The self-instructional course teaches the basic concepts and techniques of PERT (Program Evaluation Review Technique). The course consists of six volumes and is intended for use by Air Force managers. Presented in programmed-instruction format, the course allows the student to proceed at his own pace and to learn without the aid of an instructor. (Author) (See also AD-410 245)

AD-411 278
Raytheon Co., Waltham, Mass.
PERTEACH (PERT AND PROGRAM MANAGEMENT, VOLUME III) [1963] 97p
Contract AF19(628)365
ESD-TDR-63-198, Vol. III
OTS $8.10

DESCRIPTORS: *Management engineering, *Decision making, Control systems, Programming (Computers), *Instruction manuals,

The self-instructional course teaches the basic concepts and techniques of PERT (Program Evaluation Review Technique). The course consists of six volumes and is intended for use by Air Force managers. Presented in programed-instruction format, the course allows the student to proceed at his own pace and to learn without the aid of an instructor. (Author) (See also AD-410 273)

AD-411 277
Raytheon Co., Waltham, Mass.
PERTEACH (PERT NETWORK DEVELOPMENT AND COMPUTER PROCESSING, VOLUME IV) [1963] 117p
Contract AF19(628)365
ESD-TDR-63-198, Vol. IV
OTS $9.60

DESCRIPTORS: *Management engineering, *Decision making, Control systems, *Programming (Computers), *Instruction manuals,

The self-instructional course teaches the basic concepts and techniques of PERT (Program Evaluation Review Technique). The course consists of six volumes and is intended for use by Air Force managers. Presented in programed-instruction format, the course allows the student to proceed at his own pace and to learn without the aid of an instructor. (Author) (See also AD-411 278)

AD-410 244
Raytheon Co., Waltham, Mass.
PERTEACH (PERT NETWORK DEVELOPMENT AND COMPUTER PROCESSING, VOLUME V). [1963] 140p
Contract AF19(628)365
ESD-TDR-63-198, Vol. V
OTS $10.50

DESCRIPTORS: *Management engineering, *Decision making, Control systems, *Programming (Computers), *Instruction manuals,

The self-instructional course teaches the basic concepts and techniques of PERT (Program Evaluation Review Technique.) The course consists of six volumes and is intended for use by Air Force managers. Presented in programmed-instruction format, the course allows the student to proceed at his own pace and to learn without the aid of an instructor. (Author) (See also AD-411 277)

AD-409 914
Raytheon Co., Waltham, Mass.
PERTEACH (WORK BOOK, VOLUME VI) [1963] 47p
Contract AF19(628)365
ESD-TDR-63-198, Vol VI
OTS $4.60

DESCRIPTORS: *Management engineering, *Decision making, Control systems, Programming (Computers), *Instruction manuals,

The self-instructional course teaches the basic concepts and techniques of PERT (Program Evaluation Review Technique). The course consists of six volumes and is intended for use by Air Force managers. Presented in programmed-instruction format, the course allows the student to proceed at his own pace and to learn without the aid of an instructor. (Author) (See also AD-410 244)

AD-431 950 repriced
Smithsonian Institution, Washington, D. C.
AIR FORCE RESEARCH RESUMES, 1963. Volume 4.
[1964] 586p.
Contract AF49(638)1213
OAR-016
OTS $7.00

DESCRIPTORS: *Air Force research, *Indexes, *Abstracts, Chemistry, Metallurgy, Solid state physics, Nuclear physics, Electricity, Magnetism, Optics, Control systems, Energy conversion, Mechanics, Fluid mechanics, Geology, Mathematics, Atmosphere, Meteorology, Astrophics, Psychology, Biology, Medicine.

(See also AD-401 600)

AD-DIVISION INDEX

AD No.	Div.
437 900	8
437 901	14
437 902	20
437 903	6
437 905	6
437 906	25
437 907	30
437 909	27
437 910	7
437 914	8
437 917	28
437 918	30
437 919	22
437 920	15
437 923	16
437 924	30
437 926	7
437 927	19
437 928	29
437 929	16
437 930	16
437 931	7
437 932	14
437 935	25
437 936	5
437 937	8
437 938	30
437 940	23
437 941	25
437 942	7
437 945	4
437 946	8
437 949	8
437 950	2
437 952	25
437 953	28
437 954	28
437 955	25
437 956	25
437 959	24
437 960	4
437 961	13
437 962	4
437 965	17
437 972	12
437 973	9
437 974	6
437 975	1
437 976	3
437 979	10
437 980	14
437 981	8
437 982	23
437 983	15
437 986	7
437 987	16
437 991	13
437 994	20
437 995	25
437 996	4
437 997	14
437 998	15
437 999	15
438 000	9
438 003	25
438 007	2
438 008	29
438 009	26
438 010	8
438 011	22
438 012	25
438 013	26
438 014	22
438 020	14
438 021	14
438 025	32
438 026	8
438 028	12

AD No.	Div.
438 029	8
438 030	12
438 031	5
438 035	6
438 036	6
438 037	24
438 045	25
438 046	20
438 047	16
438 050	14
438 051	25
438 052	8
438 053	25
438 054	12
438 129	8
438 130	20
438 132	14
438 133	8
438 134	8
438 135	2
438 136	14
438 137	14
438 138	17
438 141	14
438 142	17
438 143	31
438 144	16
438 145	14
438 146	33
438 147	20
438 163	4
438 166	1
438 168	2
438 169	25
438 170	25
438 171	9
438 173	23
438 174	33
438 175	1
438 176	17
438 177	32
438 178	32
438 180	25
438 181	25
438 185	8
438 187	4
438 188	4
438 192	8
438 195	27
438 196	8
438 197	16
438 198	16
438 199	16
438 200	16
438 205	12
438 206	14
438 208	8
438 209	28
438 215	28
438 216	2
438 221	30
438 222	8
438 223	4
438 225	27
438 226	16
438 227	25
438 231	16
438 232	25
438 233	25
438 235	33
438 238	28
438 252	5
438 253	8
438 254	8
438 255	30
438 256	5
438 258	26
438 259	25

AD No.	Div.
438 260	2
438 261	9
438 262	9
438 263	9
438 264	8
438 297	4
438 389	16
438 395	16
438 396	4
438 401	8
438 403	14
438 405	11
438 406	11
438 407	25
438 411	4
438 412	4
438 413	2
438 417	32
438 418	24
438 419	25
438 421	9
438 422	25
438 425	6
438 427	25
438 428	25
438 429	5
438 430	5
438 431	8
438 432	26
438 433	15
438 434	20
438 435	18
438 436	18
438 437	2
438 438	30
438 439	15
438 449	25
438 450	9
438 456	4
438 458	16
438 459	16
438 460	16
438 461	16
438 463	2
438 466	16
438 468	16
438 469	25
438 470	14
438 471	14
438 477	9
438 478	17
438 484	25
438 485	16
438 486	8
438 494	4
438 497	8
438 498	8
438 506	12
438 513	28
438 514	8
438 515	25
438 516	25
438 517	12
438 519	7
438 520	14
438 521	8
438 524	22
438 526	7
438 528	16
438 529	16
438 530	16
438 531	16
438 532	16
438 533	16
438 534	16
438 535	16
438 536	16
438 537	16

AD No.	Div.
438 538	16
438 539	16
438 540	16
438 541	16
438 542	16
438 543	16
438 544	16
438 545	14
438 546	15
438 559	30
438 560	25
438 639	26
438 640	16
438 641	16
438 652	16
438 653	16
438 654	16
438 655	9
438 656	16
438 657	16
438 658	16
438 662	30
438 664	10
438 665	16
438 666	16
438 667	16
438 680	23
438 681	16
438 682	16
438 683	16
438 684	16
438 685	16
438 691	16
438 692	16
438 693	16
438 694	16
438 695	16
438 696	16
438 697	16
438 698	16
438 699	16
438 700	16
438 701	16
438 705	30
438 711	20
438 713	27
438 714	27
438 715	27
438 716	27
438 718	17
438 720	12
438 722	8
438 723	6
438 741	16
438 742	16
438 743	16
438 745	16
438 746	16
438 747	16
438 748	16
438 751	16
438 752	16
438 753	16
438 777	17
438 779	17
438 781	14
438 782	3
438 783	16
438 784	30
438 785	9
438 786	26
438 811	31
438 812	31
438 813	31
438 814	31
438 815	17
438 822	8
438 825	16

AD No.	Div.
439 644	10
439 645	8
439 647	25
439 648	23
439 649	8
439 651	2
439 652	7
439 655	26
439 657	26
439 658	4
439 662	12
439 664	30
439 665	22

AD No.	Div.
439 666	16
439 670	7
439 672	8
439 674	16
439 675	17
439 676	25
439 678	14
439 680	12
439 681	27
439 683	25
439 684	20
439 685	25
439 686	25

AD No.	Div.
439 688	2
439 689	22
439 691	2
439 694	8
439 695	25
439 696	14
439 716	25
439 718	12
439 722	10
439 727	4
439 728	24
439 807	20
439 808	8

AD No.	Div.
439 829	7
439 830	8
439 831	25
439 833	8
439 834	27
439 835	7
439 837	20
439 838	25
439 839	25
439 842	17
439 846	25
439 856	26
439 857	26

AD No.	Div.
438 826	30
438 832	9
438 833	16
438 835	2
438 836	30
438 838	25
438 840	25
438 843	2
438 844	14
438 846	30
438 854	31
438 855	15
438 856	12
438 857	25
438 858	8
438 865	25
438 866	18
438 867	8
438 872	12
438 873	12
438 874	12
438 875	17
438 879	8
438 883	25
438 884	16
438 885	16
438 886	16
438 890	9
438 893	25
438 895	16
438 908	20
438 909	16
438 910	22
438 915	33
438 918	2
438 919	17
438 920	32
438 921	17
438 922	12
438 924	23
438 926	9
438 927	4
438 936	6
438 937	26
438 938	8
438 941	19
438 947	22
438 948	25
438 949	2
438 951	2
438 955	20
438 958	12
438 959	8
438 963	8
438 964	8
438 980	15
439 000	25
439 003	25
439 004	8
439 005	4
439 007	25
439 008	9
439 010	25
439 011	15
439 012	15
439 013	25
439 014	30
439 015	16
439 016	16
439 017	15
439 018	25
439 020	16
439 021	16
439 022	16
439 023	16
439 024	16
439 025	15
439 026	16
439 027	16
439 028	16
439 043	25
439 049	16
439 052	16

AD No.	Div.
439 053	16
439 054	23
439 055	16
439 056	16
439 060	16
439 061	16
439 062	16
439 063	16
439 064	16
439 065	16
439 066	16
439 067	16
439 068	16
439 069	16
439 070	16
439 071	16
439 076	15
439 077	25
439 085	17
439 088	16
439 090	30
439 093	1
439 094	8
439 097	16
439 200	30
439 201	12
439 202	12
439 203	8
439 204	32
439 205	27
439 206	16
439 207	31
439 208	31
439 209	25
439 210	25
439 211	2
439 212	2
439 213	25
439 214	2
439 216	17
439 217	14
439 218	8
439 219	9
439 220	9
439 221	25
439 222	17
439 223	8
439 224	8
439 225	22
439 226	2
439 227	2
439 228	2
439 229	25
439 230	8
439 231	17
439 233	25
439 234	32
439 235	32
439 236	8
439 237	8
439 238	8
439 240	8
439 241	8
439 242	4
439 243	4
439 244	25
439 248	2
439 251	18
439 253	16
439 254	16
439 255	16
439 258	15
439 259	15
439 262	15
439 263	8
439 265	15
439 270	16
439 271	16
439 272	16
439 273	16
439 274	16
439 277	16
439 278	16

AD No.	Div.
439 280	8
439 282	16
439 283	16
439 284	16
439 285	16
439 286	16
439 290	2
439 291	31
439 292	16
439 293	16
439 294	16
439 295	16
439 296	16
439 297	16
439 298	16
439 299	16
439 300	16
439 303	16
439 304	16
439 305	16
439 306	16
439 307	16
439 308	16
439 309	16
439 310	16
439 311	16
439 312	16
439 313	16
439 314	4
439 315	4
439 316	16
439 317	16
439 318	16
439 319	16
439 320	16
439 321	16
439 322	16
439 323	16
439 324	16
439 325	16
439 328	25
439 329	26
439 330	2
439 331	20
439 332	20
439 333	30
439 334	27
439 335	22
439 336	2
439 337	22
439 340	32
439 345	30
439 350	2
439 351	1
439 353	16
439 354	2
439 355	32
439 356	22
439 357	1
439 358	12
439 359	5
439 365	25
439 373	32
439 374	25
439 377	18
439 380	9
439 381	16
439 382	13
439 383	3
439 384	17
439 391	9
439 396	18
439 398	3
439 399	7
439 402	4
439 403	10
439 404	25
439 405	6
439 408	26
439 410	6
439 415	2
439 416	2
439 418	30

AD No.	Div.
439 421	27
439 422	2
439 424	15
439 425	8
439 426	22
439 427	14
439 429	25
439 430	28
439 431	28
439 432	28
439 433	12
439 434	2
439 435	25
439 436	25
439 437	5
439 438	25
439 439	30
439 440	8
439 442	5
439 443	17
439 445	14
439 446	26
439 447	27
439 449	14
439 451	22
439 453	25
439 454	7
439 482	2
439 484	8
439 485	8
439 486	8
439 488	22
439 491	14
439 492	14
439 493	12
439 494	8
439 497	25
439 498	26
439 499	18
439 502	16
439 503	8
439 507	9
439 510	2
439 511	12
439 518	12
439 520	8
439 524	30
439 525	25
439 526	9
439 527	4
439 528	8
439 530	25
439 583	20
439 585	8
439 587	22
439 588	31
439 592	17
439 595	20
439 597	24
439 599	14
439 601	14
439 604	25
439 605	25
439 606	26
439 607	4
439 609	25
439 610	28
439 612	18
439 614	25
439 615	8
439 616	9
439 617	30
439 618	12
439 620	14
439 624	30
439 629	8
439 631	9
439 633	29
439 639	16
439 640	8
439 641	20
439 642	9
439 643	16

NUMBER INDEX

Number	Page
AAL-TN-62-13	S-34
AAL-TN-62-16	S-34
AD-1 739	S-37
AD-6144	S-44
AD-9426	S-37
AD-14 055	S-30
AD-16 150	S-37
AD-19 500	S-25
AD-25 088	S-26
AD-47 115	S-29
AD-53 104	S-22
AD-84 793	S-27
AD-107 224	S-41
AD-146 047	S-34
AD-155 153	S-2
AD-160 064	S-23
AD-202 400	S-22
AD-202 507	S-23
AD-215 905	S-50
AD-218 902	S-3
AD-219 478	S-50
AD-219 479	S-50
AD-226 822	S-7
AD-228 802	S-9
AD-228 807	S-9
AD-231 542	S-1
AD-231 547	S-20
AD-235 895	S-13
AD-238 115	S-17
AD-244 205	S-5
AD-245 919	S-57
AD-247 014	S-5
AD-249 625	S-11
AD-250 044	S-8
AD-250 046	S-10
AD-250 049	S-7
AD-250 050	S-13
AD-250 051	S-13
AD-250 865	S-72
AD-250 983	S-18
AD-250 987	S-12
AD-250 988	S-13
AD-251 125	S-32
AD-253 002	S-19
AD-253 004	S-19
AD-253 005	S-11
AD-253 319	S-36
AD-254 751	S-19
AD-254 752	S-16
AD-267 487	S-26
AD-273 115	S-53
AD-279 089	S-17
AD-279 090	S-13
AD-279 091	S-16
AD-279 444	S-27
AD-279 504	S-12
AD-279 505	
see AD-280 434	S-46
AD-279 506	S-4
AD-279 539	
see AD-280 433	S-4
AD-280 119	S-39
AD-280 417	
see AD-279 504	S-12
AD-280 418 canceled	S-17
AD-280 419	S-19
AD-280 420	S-2
AD-280 421 canceled	S-13
AD-280 422 canceled	S-4
AD-280 423	S-9
AD-280 432	S-21
AD-280 433	S-4
AD-280 434	S-46
AD-281 389	S-28
AD-281 391	S-15
AD-282 877	S-48
AD-283 916	S-45
AD-283 918	S-45
AD-285 514	S-43
AD-287 082	S-11
AD-287 093	S-10
AD-289 659	S-40
AD-290 479	S-30
AD-291 569	S-52
AD-291 659	S-26
AD-292 146	S-50
AD-294 117	S-25
AD-295 588	S-14
AD-295 662	S-14
AD-402 415	S-31
AD-403 092	S-16
AD-403 116	S-6
AD-403 595	S-17
AD-405 551	S-36
AD-406 155	S-55
AD-406 365	S-53
AD-407 553	S-48
AD-409 810 canceled	S-48
AD-409 914	S-54
AD-410 244	S-54
AD-410 245	S-54
AD-410 273	S-54
AD-411 277	S-54
AD-411 278	S-54
AD-413 128	S-39
AD-417 086	S-32
AD-418 269	S-20
AD-420 946	S-22
AD-420 947	S-4
AD-420 948	S-3
AD-421 144	S-4
AD-421 848	S-18
AD-422 291	S-2
AD-422 442	S-47
AD-422 509	S-7
AD-422 688	S-13
AD-422 773	S-12
AD-423 076	S-20
AD-423 077	S-11
AD-423 169	S-34
AD-423 179	S-44
AD-423 372	S-48
AD-423 378	S-49
AD-423 379	S-41
AD-423 385	S-5
AD-423 387	S-43
AD-423 389	S-38
AD-423 390	S-21
AD-423 397	S-3
AD-423 398	S-43
AD-423 657	S-2
AD-423 686	S-38
AD-423 696	S-15
AD-423 701	S-46
AD-423 948	S-15
AD-424 097	S-42
AD-424 120	S-12
AD-424 189	S-14
AD-424 879	S-41
AD-424 891	S-52
AD-425 079	S-38
AD-425 080	S-38
AD-425 081	S-32
AD-425 083	S-52
AD-425 209	S-45
AD-425 215	S-37
AD-425 217	S-41
AD-425 220	S-37
AD-425 477	S-16
AD-425 541	S-15
AD-425 542	S-12
AD-425 564	S-4
AD-425 600	S-17
AD-425 692	S-17
AD-425 889	S-37
AD-425 940	S-10
AD-426 008	S-6
AD-426 027	S-17
AD-426 121	S-18
AD-428 226 repriced	S-42
AD-428 907 repriced	S-32
AD-430 890	S-30
AD-431 950 repriced	S-54
AD-433 587 repriced	S-52
AD-434 081 repriced	S-34
AD-434 115 repriced	S-34
AD-434 329 repriced	S-49
AELRDL-2402-TR	S-52
AFCRL-62-727	S-26
AFCRL-62-736	S-27
AIL-1124-I-2	S-26
AIL-1124-1-4	S-26
ALI-C-62081	S-33
Alcoa-7-63-AP59-S	S-43
AMRL-519	S-18
ANL-6271	S-47
ANL-6649	S-47
ANL-6796	S-24
ANL-6802	S-36
ANL-6809	S-47
ANL-6820	S-39
ANL-6880	S-47
AOER-2-03	S-50
ARA-TR-235-4	S-41
ARA-TR-235-3	S-40
AROD-1110:6	S-41
AROD-1716:17	S-39
ASD-TDR-62-447	S-50
ASD-TDR-63-265	S-34
ASD-TDR-63-269	S-44
ASD-TR-62-7-868	S-43
ATI-79 350	S-23
ATI-139 373	S-51
ATI-197 792	S-41
BNL-805	S-3
BNL-C-38	S-3
CCMO-AD-M13	S-40
CEND-190	S-47
CML-TN-P9	S-22
CONF-39-23	S-46
CONF-187-113	S-45
DASA-1360	S-47
DMIC-M-170	S-42
DRL-A-125	S-23
DRL-A-128	S-22
EFINS-64-5	S-23
ESD-TDR-63-198, v. 1	S-54
ESD-TDR-63-198, v. 2	S-54
ESD-TDR-63-198, v. 3	S-54
ESD-TDR-63-198, v. 4	S-54
ESD-TDR-63-198, v. 5	S-54
ESD-TDR-63-198, v. 6	S-54
FA-R-1090	S-44
FZM-2690	S-43
HAC-TM-262	S-30
HAC-TM-264	S-29
HAC-TM-266, pts. 1, 2	S-28
HAC-TM-316	S-29
HAC-TM-320	S-29
HAC-TM-352	S-29
HAC-TM-372	S-28
HAC-TM-380	S-29
HW-68600 37	S-1
HW-77080	S-25
HW-77529	S-43
HW-77770	S-44
HW-SA-2932	S-46
Hydro-TR-007-3	S-41
IDO-16757	S-45
IITRI-1066-4	S-48
IITRI-90-1228A-2	S-37
IITRI-A031-4, R-3	S-37
IITRI-A031-4, R-4	S-37
IITRI-M6053	S-24
IS-615	S-24
IS-676	S-44
IS-741	S-21
IS-760	S-46
IS-762	S-47
IS-770	S-21
IS-800	S-21
IS-810	S-52
JPL-TR-32-403	S-36
JPL-TR-32-546	S-40
JPL-TR-32-569	S-30
LIR-TR-182	S-38
Lock-ER-6793	S-47
MH-MPG-1525-TR-1	S-2
MTI-63TR50	S-37
ML-570	S-50
ML-595	S-50
ML-596	S-50
N62-11663	S-39
N63-1743	S-48
N63-12155	S-42
N63-13538	S-6
N63-13852	S-27
N63-13974	S-43
N63-13989	S-26
N63-14789	S-20
N63-15026	S-52
N63-16508	S-7
N63-16626	S-33
N63-18324	S-31
N63-22216	S-51
N63-22348	S-52
N63-22665	S-20
N63-22666	S-11
N63-22667	S-9
N63-22980	S-10
N63-22981	S-3
N63-23338	S-3
N63-23339	S-8
N63-23514	S-22
N63-23658	S-2
N63-23780	S-4
N63-23811	S-4
N64-10558	S-16
N64-12045	S-42
N64-12176	S-12
N64-12246	S-12
N64-12261	S-47
N64-12340	S-14
N64-12344	S-38
N64-12663	S-44
N64-12677	S-7
N64-12814	S-38
N64-12817	S-38
N64-12835	S-18
N64-12855	S-6
N64-12864	S-17
N64-12865	S-12
N64-12867	S-43
N64-13078	S-20
N64-13852	S-10
N64-13865	S-16
N64-13869	S-4
N64-16526	S-25
N64-16535	S-44
N64-16537	S-45
N64-16666	S-39
N64-16671	S-24
N64-16695	S-40
N64-17254	S-22
N64-17255	S-22
N64-17266	S-51
N64-17291	S-40
N64-17292	S-21
N64-17293	S-44
N64-17501	S-24
N64-17577	S-45
N64-17582	S-53
N64-17584	S-39
N64-17591	S-37
N64-17675	S-36
N64-17684	S-47
N64-17717	S-40
N64-17739	S-21
N64-17743	S-47
N64-17824	S-21
N64-17835	S-47
N64-17978	S-44
N64-17979	S-21
N64-17980	S-46
N64-17987	S-24
N64-17989	S-30
N64-17990	S-24
N64-17991	S-42
N64-17992	S-50
N64-17993	S-25
N64-17994	S-42
N64-18078	S-33
N64-18079	S-45
N64-18080	S-47
N64-18082	S-28
N64-18121	S-22
N64-18216	S-36
N64-18275	S-47
N64-18297	S-40
N64-18298	S-41
N64-18300	S-24
N64-18301	S-51
N64-18304	S-30
N64-18305	S-43
N64-18395	S-44
N64-18422	S-51
N64-18425	S-30
N64-18428	S-44
N64-18429	S-39
N64-18430	S-40
N64-18431	S-1
N64-18432	S-1
N64-18433	S-1
N64-18438	S-30
N64-18439	S-1
N64-18442	S-24

Number	Page	Number	Page	Number	Page	Number	Page
UCRL-11180	S-44	UCRL-11252	S-21	W-J63-609R10	S-32	X-671-63-270	S-34
UCRL-11200(Vol. I)	S-24	UCRL-11300	S-46	WVT-RR-6320	S-41		

Number	Page
N64-18445	S-24
N64-18448	S-39
N64-18452	S-40
N64-18455	S-50
N64-18456	S-32
N64-18457	S-32
N64-18476	S-40
N64-18480	S-23
N64-18500	S-34
N64-18510	S-24
N64-18726	S-25
N64-18727	S-32
N64-18728	S-40
N64-18729	S-40
N64-18730	S-33
N64-18731	S-42
N64-18732	S-22
N64-18733	S-42
N64-18734	S-2
N64-18735	S-41
N64-18737	S-49
N64-18951	S-25
N64-18952	S-51
N64-18953	S-42
N64-18955	S-34
N64-18956	S-33
N64-18957	S-33
N64-18958	S-25
N64-18959	S-48
N64-18960	S-51
N64-18961	S-21
N64-18962	S-24
N64-19002	S-25
N64-19060	S-33
NAA-SR-7398	S-42
NASA-CR-20	S-24
NASA-CR-24	S-32
NASA-CR-25	S-32
NASA-CR-28	S-25
NASA-CR-32	S-30
NASA-CR-33	S-24
NASA-CR-34	S-25
NASA-CR-40	S-51
NASA-CR-44	S-32
NASA-CR-53104	S-51
NASA-CR-53180	S-23
NASA-CR-53198	S-53
NASA-CR-53200	S-39
NASA-CR-53201	S-37
NASA-CR-53233	S-45
NASA-CR-53354	S-40
NASA-CR-53361	S-41
NASA-CR-53424	S-22
NASA-CR-53508	S-24
NASA-CR-53531	S-36
NASA-CR-53557	S-30
NASA-CR-53558	S-43
NASA-CR-53561	S-30
NASA-CR-53564	S-51
NASA-CR-53568	S-39
NASA-CR-53575	S-40
NASA-CR-53576	S-1
NASA-CR-53577	S-50
NASA-CR-53580	S-24
NASA-CR-53581	S-24
NASA-CR-53583	S-40
NASA-CR-53585	S-30
NASA-CR-53589	S-1
NASA-CR-53590	S-1
NASA-CR-53591	S-1
NASA-CR-53592	S-44
NASA-CR-53593	S-39
NASA-CR-53610	S-40
NASA-CR-55842	S-36
NASA-CR-56004	S-47
NASA Order-R-104	S-39
NASA Order-R-104	S-46
NASA Order-T-7632	S-39
NASA Order-T-7632	S-46
NASA-TM-X-51579	S-34
NASA-TN-D-2054	S-42
NASA-TN-D-2072	S-33
NASA-TN-D-2120	S-45
NASA-TN-D-2157	S-34
NASA-TN-D-2174	S-40
NASA-TN-D-2175	S-40
NASA-TN-D-2189	S-33
NASA-TN-D-2198	S-33
NASA-TN-D-2235	S-47
NASA-TN-D-2236	S-42
NASA-TN-D-2237	S-33
NASA-TN-D-2239	S-42
NASA-TN-D-2242	S-22
NASA-TN-D-2247	S-42
NASA-TN-D-2250	S-50
NASA-TN-D-2251	S-25
NASA-TN-D-2255	S-2
NASA-TN-D-2262	S-41
NASA-TN-D-2263	S-25
NASA-TN-D-2266	S-48
NASA-TN-D-2268	S-33
NASA-TN-D-2269	S-28
NASA-TN-D-2273	S-49
NASA-TN-D-2275	S-51
NASA-TN-D-2276	S-21
NASA-TN-D-2280	S-24
NASA-TN-D-2289	S-25
NASA-TR-R-165	S-42
NAVWEPS-17-20GF-04, rev.	S-27
NAVWEPS-17-20JV-01	S-27
NAVWEPS-5730	S-34
NEL-166	S-31
NEL-1063	S-31
NOLTR-63-13	S-47
NP-11675	S-33
NP-12422	S-45
NRL-6012	S-42
NRL-6016	S-30
OAR-016	S-54
ORNL-3341	S-22
ORNL-3398	S-43
ORNL-3465	S-22
ORNL-3481	S-25
ORNL-3485	S-51
ORNL-3503	S-47
ORNL-3505	S-46
ORNL-3509	S-24
ORNL-3513	S-35
ORNL-3535	S-47
ORNL-3542	S-47
ORNL-3547	S-47
ORNL-3551	S-44
ORNL-3554	S-40
ORNL-3555	S-47
ORNL-3558	S-45
ORNL-3563	S-35
ORNL-3567	S-39
ORNL-3570	S-45
ORNL-3583	S-39
ORNL-3581	S-40
ORNL-TM-285	S-35
OSURF-601-8	S-27
OSURF-1083-22	S-31
OTS-SB-523	S-31
OTS-SB-529	S-36
OTS-SB-530	S-1
OTS-SB-531	S-4
OTS-SB-532	S-23
OTS-SB-533	S-53
PA-TM-1145	S-38
PA-TR-3102	S-51
PB-165 258	S-23
PB-165 259	S-22
PB-165 306	S-57
PB-165 309	S-30
PB-165 310	S-29
PB-165 311	S-28
PB-165 312	S-29
PB-165 313	S-29
PB-165 314	S-28
PB-165 315	S-29
PB-165 316	S-23
PB-165 317	S-41
PB-165 318	S-23
PB-165 319	S-34
PB-165 320	S-30
PB-165 321	S-39
PB-165 328	S-18
PB-165 329	S-41
PB-165 330	S-26
PB-165 331	S-27
PB-165 332	S-2
PB-165 334	S-37
PB-165 335	S-37
PB-165 336	S-37
PB-165 337	S-28
PB-165 338	S-36
PB-165 339	S-51
PB-165 340	S-25
PB-165 341	S-26
PB-165 342	S-31
PB-165 343	S-32
PB-165 344	S-31
PB-165 633	S-50
PB-165 634	S-50
PB-165 635	S-50
PB-165 872	S-33
PB-165 873	S-33
PB-165 874	S-2
PB-165 875	S-3
PB-165 876	S-51
PB-165 877	S-27
PB-165 878	S-29
PB-165 879	S-22
PB-165 880	S-13
PB-165 881	S-19
PB-165 883	S-20
PB-165 886	S-10
PB-165 887	S-3
PB-165 888	S-11
PB-165 891	S-9
PB-165 892	S-6
PB-165 893	S-8
PB-165 895	S-14
PB-165 901	S-6
PB-165 902	S-7
PB-165 906	S-7
PB-165 907	S-19
PB-165 908	S-12
PB-165 909	S-11
PB-165 912	S-13
PB-165 913	S-13
PB-165 914	S-13
PB-165 916	S-12
PB-165 917	S-19
PB-165 918	S-16
PB-165 921	S-20
PB-165 922	S-19
PB-165 924	S-8
PB-165 925	S-18
PB-165 926	S-10
PB-165 927	S-8
PB-165 928	S-5
PB-165 929	S-6
PB-165 930	S-8
PB-165 932	S-18
PB-165 933	S-9
PB-165 935	S-16
PB-165 936	S-15
PB-165 937	S-11
PB-165 940	S-20
PB-165 946	S-17
PB-165 947	S-5
PB-165 948	S-9
PB-165 952	S-7
PB-165 956	S-9
PB-165 957	S-1
PB-165 959	S-5
PB-166 000	S-44
PB-181 655, rev.	S-27
PB-181 655-1	S-27
PB-181 674	S-27
PB-181 675	S-35
PB-181 676	S-35
PB-181 677	S-35
PB-181 678	S-35
PIB-221	S-30
PIBMRI-282-52	S-30
PLASTEC-9	S-25
PRL-TDR-63-6	S-39
R62SD47;	S-52
RADC-TDR-63-39	S-2
RADC-TDR-63-93	S-55
RADC-TDR-63-137	S-32
RADC-TDR-62-433	S-52
RLES-AST-4015-101-64U	S-1
RLT-66	S-38
RM-3950-NASA	S-24
RTD-TDR-63-3056	S-41
RTD-TDR-63-4276	S-32
RTD-TDR-63-4184	S-52
SAM-59-23	S-8
SAM-59-36	S-5
SAM-59-38	S-6
SAM-59-46	S-9
SAM-59-66	S-8
SAM-59-74	S-7
SAM-59-89	S-9
SAM-59-90	S-1
SAM-60-10	S-20
SAM-60-46	S-17
SAM-60-64	S-5
SAM-60-69	S-5
SAM-60-86	S-18
SAM-60-93	S-10
SAM-61-10	S-7
SAM-61-15	S-19
SAM-61-16	S-12
SAM-61-17	S-11
SAM-61-22	S-13
SAM-61-26	S-13
SAM-61-27	S-13
SAM-61-30	S-12
SAM-61-31	S-19
SAM-61-32	S-16
SAM-61-53	S-20
SAM-61-90	S-12
SAM-61-96	S-16
SAM-61-101	S-19
SAM-61-110	S-9
SAM-61-117	S-2
SAM-62-(1-4)	S-4
SAM-62-5	S-18
SAM-62-7	S-21
SAM-62-10	S-17
SAM-62-16	S-9
SAM-62-20	S-13
SAM-62-23	S-46
SAM-62-27	S-4
SAM-62-35	S-19
SAM-62-47	S-16
SAM-62-50	S-15
SAM-62-55	S-11
SAM-AR-2-60	S-13
SAM-AR-3-63	S-20
SAM-AR-5-60	S-19
SAM-AR-7-63	S-2
SAM-AR-9-63	S-17
SAM-TDR-62-48	S-15
SAM-TDR-62-64	S-11
SAM-TDR-62-71	S-10
SAM-TDR-62-100	S-6
SAM-TDR-62-110	S-16
SAM-TDR-62-117	S-6
SAM-TDR-62-123	S-14
SAM-TDR-62-128	S-7
SAM-TDR-62-129	S-17
SAM-TDR-62-133	S-14
SAM-TDR-63-9	S-18
SAM-TDR-63-27	S-3
SAM-TDR-63-35	S-2
SAM-TDR-63-36	S-3
SAM-TDR-63-39	S-3
SAM-TDR-63-40	S-20
SAM-TDR-63-41	S-11
SAM-TDR-63-44	S-4
SAM-TDR-63-50	S-18
SAM-TDR-63-52	S-15
SAM-TDR-63-53	S-9
SAM-TDR-63-54	S-13
SAM-TDR-63-55	S-20
SAM-TDR-63-56	S-12
SAM-TDR-63-57	S-10
SAM-TDR-63-59	S-6
SAM-TDR-63-60	S-12
SAM-TDR-63-61	S-4
SAM-TDR-63-62	S-22
SAM-TDR-63-65	S-22
SAM-TDR-63-66	S-4
SAM-TDR-63-67	S-8
SAM-TDR-63-69	S-11
SAM-TDR-63-71	S-14
SAM-TDR-63-75	S-14
SAM-TDR-63-78	S-7
SAM-TDR-63-79	S-15
SAM-TDR-63-81	S-17
SAM-TDR-63-88	S-16
SAM-TDR-63-87	S-17
SAM-TDR-63-93	S-12
SC-4454(RR)	S-48
SEL-64-003	S-39
SEL-TR-901-1	S-50
SEL-TR-901-3	S-50
SEL-TR-901-4	S-50
SRI-3581	S-41
SSL(UC)5-12	S-39
SSL(UC)5-18	S-40
TAM-252	S-38
TRW-C107-3U1	S-55
UARI-RR-9	S-50
UCID-1800, superseded	S-24
UCID-4506	S-47
UCRL-7619	S-40
UCRL-10652	S-46
UCRL-10863	S-46
UCRL-10925	S-21
UCRL-11046	S-10
UCRL-11143	S-44

SUBJECT INDEX

Subject	Page	Number
4340 Steel	S-42	AD-428 226
	S-43	AD-423 387
Absorbent disc method	S-13	AD-279 090
Abstracting	S-54	AD-431 950
	S-55	AD-406 155
Acceleration	S-7	AD-422 509
Acceleration tolerance	S-5	PB-165 959
Acclimatization	S-8	PB-165 927
Acenaphthlyene	S-38	AD-425 079
Acetazolamide	S-10	PB-165 926
Adaptation (Physiology)	S-8	PB-165 927
	S-9	PB-165 933
Adaptive control systems	S-40	N64-18476
Adrenal glands	S-18	AD-421 848
Aedes	S-3	AD-423 397
Aerobee	S-34	N64-18500
Aerodynamic characteristics	S-42	NASA-TN-D-2236
		NASA-TN-D-2239
		NASA-TN-D-2247
Afterglow	S-23	PB-165 316
Afterimages	S-7	AD-422 509
Agar columns	S-4	AD-280 433
Agglutinins	S-15	AD-281 391
Agriculture	S-1	OTS-SB-530
Air blast	S-47	AD-422 442
Air Force personnel	S-2	AD-280 420
		AD-423 657
Air Force research	S-54	AD-431 950
Aircraft cabins	S-6	AD-403 116
Aircraft canopies	S-25	AD-294 117
Aircraft materials	S-25	NASA-CR-28
Airplane engine noise	S-2	AD-280 420
Alanines	S-46	AD-280 434
Aldehyde-lyases	S-18	PB-165 925
Algorithms	S-40	N64-18452
Alkaline cells	S-31	OTS-SB-523
Allergy	S-17	AD-430 595
Aluminum	S-41	AD-423 379
Aluminum alloys	S-43	AD-423 398
		N64-18305
All-weather aviation	S-25	NASA-CR-34
Alveolus pulmonis	S-14	PB-165 895
Amino acids	S-46	AD-280 434
Ammonia-activated batteries	S-31	OTS-SB-523
Amphetamines	S-18	PB-165 328
AN/FPS-16	S-26	AD-291 659
Analgesics and antipyretics	S-18	PB-165 328
Analog-to-digital converters	S-30	N64-18425
Anopheles	S-3	AD-423 397
Antenna configurations	S-26	PB-165 330
	S-27	PB-165 331
	S-28	PB-165 314
	S-29	PB-165 313
	S-31	PB-165 342
Antenna masts	S-25	PB-165 340
	S-26	PB-165 341
Antenna radiation patterns	S-26	PB-165 330
	S-29	PB-165 312
Antennas	S-29	PB-165 315
Antigen-antibody reactions	S-15	AD-281 391
Antigens and antibodies	S-4	AD-280 433
	S-13	AD-279 090
	S-16	AD-279 091
Antimetabolites	S-13	AD-422 688
Antimonides	S-49	AD-423 378
Applied mathematics	S-39	AD-280 119
		AD-413 128
		PB-165 321
Argon	S-32	AD-425 081
Armed forces operations	S-39	PB-165 321
Ascorbic acid	S-15	AD-425 541
Atherosclerosis	S-15	PB-165 936
Atmosphere entry	S-42	NASA-TN-D-2239
Atmosphere models	S-23	PB-165 316
Atmospheric motion	S-23	PB-165 316
Attitude control systems	S-32	NASA-CR-24
		NASA-CR-25
Audiometry	S-9	PB-165 956
Auditory acuity	S-9	AD-280 423
Auditory tests	S-9	AD-280 423
Aviation medicine	S-2	AD-422 291
Azides	S-22	PB-165 259
	S-23	PB-165 258
B-52 aircraft	S-2	AD-280 420
Bacteria	S-13	AD-422 688
		PB-165 880
	S-14	AD-424 189
	S-16	AD-425 477
Band pass filters	S-32	AD-417 086
Band reject filters	S-32	AD-417 086
Barbiturates	S-18	PB-165 925
Barium compounds	S-32	PB-165 343
Barometric pressure	S-22	PB-165 892
Bathyscaph Trieste	S-31	PB-165 344
Batteries and components	S-29	PB-165 878
	S-31	OTS-SB-523
		PB-165 344
Battery chargers	S-31	OTS-SB-523
Beaches	S-23	PB-165 318
Bearings	S-37	AD-425 220
Bibliographies	S-1	OTS-SB-530
	S-4	OTS-SB-531
	S-23	OTS-SB-532
	S-31	OTS-SB-523
	S-36	OTS-SB-529
	S-37	AD-425-215
	S-52	AD-424 891
	S-53	OTS-SB-533
Bicarbonates	S-14	AD-295 588
		AD-295 662
Biology	S-4	OTS-SB-531
Bionics	S-52	AD-424 891
Blood	S-6	AD-403 116
Blood cells	S-20	PB-165 921
Blood chemistry	S-5	PB-165 928
	S-11	AD-287 082
Blood circulation	S-7	PB-165 902
Blood plasma	S-8	PB-165 924
Blood proteins	S-17	AD-425 600
Blood serum	S-19	PB-165 917
Blood vessels	S-7	PB-165 902
Blood volume	S-5	PB-165 947
Boundary layer	S-41	NASA-TN-D-2262
Boundary layer transition	S-42	NASA-TN-D-2054
Boundary value problems	S-50	N64-18455
Brass	S-44	PB-166 000
Brazing	S-41	AD-424 879
Breathing apparatus	S-12	AD-422 773
Bromides	S-21	IS-741
Cadmium	S-43	AD-423 387
Cadmium compounds	S-28	PB-165 337
Calcium	S-6	PB-165 901
	S-7	PB-165 906
Calcium fluoride	S-45	AD-283 916
		AD-283 918
Camera tubes	S-32	AD-428 907
Carbohydrates	S-17	AD-425 692
Carbon compounds	S-22	AD-420 946
Carbon monoxide	S-22	AD-420 946
Carbonic anhydrase	S-10	PB-165 926
Cardiography	S-11	AD-423 077
Catecholamines	S-18	AD-426 121
Cathode ray tube screens	S-32	AD-428 907
CD V-700 radiological instruments	S-45	AD-425 209
Cells (Biology)	S-21	AD-280 432
Ceramic capacitors	S-32	PB-165 343
Ceramic materials	S-37	PB-165 335
Cerebellum	S-7	PB-165 952
Cerebral cortex	S-5	PB-165 959
Cerebrum	S-18	PB-165 932
Cesium	S-32	AD-425 081
Chemistry	S-22	N64-18121
Chemotherapeutic agents	S-13	AD-422 688
		PB-165 912
		PB-165 913
		PB-165 914
Chewing gum	S-13	AD-422 688
Chlorides	S-21	IS-741
		IS-770
Chlorpromazine	S-18	PB-165 925
Cholesterol	S-15	PB-165 936
Chromium tetrafluoride	S-21	AD-423 390
Chromosomes	S-4	AD-420 947
CID W-22 auditory tests	S-9	AD-280 423
Circular aperture antennas	S-28	PB-165 314
Civil defense personnel	S-15	AD-423 696
Cleaning	S-16	AD-403 092
Closed ecological systems	S-12	AD-424 120
	S-22	AD-420 946
	S-34	AD-434 081
		AD-434 115
Clostridium	S-14	AD-424 189
Clostridium sporogenes	S-14	AD-424 189
CNS depressants	S-18	PB-165 925
CNS stimulants	S-18	PB-165 925
Coagulation	S-16	AD-279 091
Coatings	S-43	AD-423 387
	S-44	AD-423 179
Combinatorial analysis	S-39	AD-413 128
Complex compounds	S-21	IS-741
Composite materials	S-41	AD-424 879
Computers	S-45	AD-283 916
		AD-283 918
	S-53	AD-273 115
	S-55	AD-406 155
Containers	S-12	PB-165 916
Control systems	S-39	N64-18429
	S-40	N64-18430
Control theory	S-39	N64-18429
	S-40	N64-18430
Converters	S-30	N64-18438
Copper	S-44	PB-166 000
Corrosion inhibition	S-43	AD-423 387
	S-44	AD-423 179
Corticosteroid agents	S-4	AD-279 506
	S-9	PB-165 891
	S-19	PB-165 917
Cosmic rays	S-1	N64-18432
		N64-18433
Coupled antennas	S-26	PB-165 330
Creatinine	S-7	PB-165 906
Creep	S-42	AD-424 097
Cryogenics	S-47	N64-17684
Culicidae	S-3	AD-423 397
Culture media	S-4	AD-280 433
Cutting tools	S-43	AD-285 514
CV IV coatings	S-44	AD-423 179
Cylindrical bodies	S-41	N64-18298
		PB-165 317
Data processing systems	S-57	PB-165 306
Data storage systems	S-53	AD-273 115
Decision making	S-39	AD-413 128
	S-54	AD-409 914
		AD-410 244
		AD-410 245
		AD-410 273
		AD-411 277
		AD-411 278
Decompression sickness	S-19	PB-165 922
Density	S-24	NASA-CR-20
Dental fillings	S-11	PB-165 909
Dental personnel	S-2	AD-423 657
Dentistry	S-2	AD-423 657
	S-4	AD-279 506
	S-10	PB-165 886
	S-11	PB-165 909
	S-12	AD-279 504
	S-16	PB-165 935
	S-17	AD-425 692
		PB-165 946
Detectors	S-32	NASA-CR-44
Detonation waves	S-22	NASA-TN-D-2242
Dextroamphetamine sulfate	S-18	PB-165 925
Diagnosis	S-17	AD-279 089
Diagnostic agents	S-14	PB-165 895
Dielectric films	S-51	PB-165 339
Dielectrics	S-38	AD-423 686
Differential equations	S-41	NASA-TN-D-2262
Digestive system diseases	S-16	PB-165 918
Digital computers	S-40	AD-289 659
		N64-18452
Digital systems	S-30	AD-430 890
	S-40	N64-18476
Dimethyl bis (perfluoropropyl) silane	S-21	AD-423 390
Dimethyl phthalate	S-3	AD-423 397
Dimethyltin dihydride	S-21	AD-423 390
2, 4, Dinitrophenol	S-18	AD-421 848
Diodes (Semiconductor)	S-31	AD-402 415
	S-51	N64-18301
Dipole antennas	S-26	PB-165 330
	S-29	PB-165 315

Subject	Page	Number
Mastication	S-8	PB-165 930
Materials	S-34	AD-423 169
Mathematical prediction	S-39	AD-413 128
Matrix algebra	S-39	AD-413 128
Medical equipment	S-7	PB-165 902
	S-11	PB-165 888
	S-12	AD-279 504
		AD-425 542
		PB-165 908
Medical examination	S-9	AD-280 423
	S-17	AD-403 595
Meprobamate	S-18	PB-165 925
2-Mercaptoethyl guanidine	S-19	PB-165 907
Merchant ships	S-35	PB-181 675
		PB-181 676
		PB-181 677
		PB-181 678
Mercury alloys	S-11	PB-165 909
Metabolism	S-7	PB-165 906
	S-17	AD-425 692
Metabolism disorders	S-20	AD-418 269
Metallography	S-44	PB-166 000
Metalorganic compounds	S-21	AD-423 390
Meteorology	S-23	OTS-SB-532
Meteors	S-33	NASA-TN-D-2268
MG-F coatings	S-44	AD-423 179
Microminiaturization (Electronics)	S-30	N64-18425
Microorganisms	S-13	PB-165 880
Microwave amplifiers	S-26	AD-267 487
Microwave equipment	S-28	PB-165 311
		PB-165 314
	S-29	PB-165 310
		PB-165 312
		PB-165 313
		PB-165 315
	S-30	AD-290 479
		PB-165 309
	S-38	AD-423 686
Microwave networks	S-30	PB-165 320
Microwaves	S-52	AD-291 569
Mitosis	S-3	PB-165 887
Molecules	S-50	N64-18455
Molybdenum	S-44	AD-423 179
Molybdenum TZM alloy	S-43	AD-285 514
Monkeys	S-20	AD-423 076
Monoamine oxidase inhibitors	S-18	PB-165 328
Monoxides	S-22	AD-420 946
Moon	S-1	N64-18439
Motion sickness	S-18	AD-426 121
Motor reactions	S-20	PB-165 883
Mouth	S-13	AD-422 688
	S-15	AD-425 541
	S-16	AD-425 477
Mutations	S-13	PB-165 912
		PB-165 913
		PB-165 914
MX-904	S-29	PB-165 878
Mydriatics	S-8	PB-165 893
N-body problem	S-45	N64-17577
Narcotics	S-18	PB-165 328
Nerve cells	S-3	PB-165 887
Nerve impulses	S-4	AD-425 564
Neutron spectrum	S-45	CONF-187-113
Nickel	S-43	AD-423 387
Niobates	S-32	PB-165 343
Niobium	S-44	AD-423 179
Niobium alloys	S-42	AD-424 097
Nitrogen	S-7	PB-165 906
	S-24	NASA-CR-20
Nitrogen mustards	S-19	AD-280 419
Noise	S-2	AD-280 420
	S-42	NASA-TN-D-2247
	S-48	NASA-TN-D-2266
	S-52	AD-242-891
Noise (Radio)	S-48	AD-423 372
Non-destructive testing	S-38	AD-423 389
Nuclear magnetic resonance	S-46	AD-280 434
Nuclear powered vessels	S-35	PB-181 677
		PB-181 678
Nuclear propulsion	S-34	NASA-TN-D-2157
Nuclear radiation spectrometers	S-46	HW-SA-2932
Nutrition	S-5	AD-423 385
OCD 5115 counter tubes	S-45	AD-425 209
Officer personnel	S-2	AD-423 657
Optical equipment	S-51	N64-18422
Orbital trajectories	S-33	NASA-TN-D-2072
Organic phosphorus compounds	S-5	PB-165 928
Organic pigments	S-10	AD-425 940
Oxides	S-28	PB-165 337
Oxidoreductases	S-18	PB-165 328
		PB-165 925
Oxygen	S-5	PB-165 947
	S-11	AD-287 082
	S-15	AD-423 948
	S-17	AD-426 027
	S-24	NASA-CR-20
Oxygen consumption	S-10	PB-165 926
	S-18	AD-421 848
Oxygen equipment	S-12	AD-422 773
		PB-165 908
Oxygen masks	S-11	PB-165 937
	S-12	AD-422 773
Ozone	S-3	PB-165 887
Paper capacitors	S-27	AD-279 444
	S-28	AD-281 389
Parabolic flight paths	S-7	AD-422 509
Parametric amplifiers	S-26	AD-291 659
Partial differential equations	S-39	N64-17584
Particles	S-24	IS-615
	S-45	N64-17577
Pentobarbital sodium	S-18	PB-165 925
Peritoneum	S-19	PB-165 922
Permeability	S-6	PB-165 901
Personality	S-17	PB-165 946
PERT	S-54	AD-409 914
		AD-410 244
		AD-410 245
		AD-410 273
		AD-411 277
		AD-411 278
PFR-6 coatings	S-44	AD-423 179
Phase detectors	S-28	NASA-TN-D-2269
Phosphates	S-5	PB-165 928
	S-7	PB-165 906
Phosphorescent materials	S-45	AD-283 916
		AD-283 918
Phosphorus	S-10	AD-287 093
Phosphorus transferases	S-18	PB-165 925
Photochemistry	S-22	AD-420 946
Photoelectric effect	S-49	AD-423 378
Photometers	S-1	N64-18439
Plasma physics	S-39	N64-17584
	S-48	AD-407 553
	S-49	NASA-TN-D-2273
Plasma sheath	S-52	AD-291 569
Plastics	S-25	AD-294 117
Plywood	S-37	AD-425 889
Poisonous gases	S-22	AD-420 946
Polarized radars	S-27	PB-165 877
Poliomyelitis virus	S-13	AD-279 090
Polyethylene plastics	S-38	AD-423 389
Polymers	S-38	AD-425 079
Position finding	S-2	AD-422 291
Positioning reactions	S-7	PB-165 952
Potassium	S-7	PB-165 906
Powder metallurgy	S-43	AD-423 398
Pressure suits	S-6	AD-426 008
Pressure vessels	S-24	N64-18445
Primary cells	S-29	PB-165 878
	S-31	OTS-SB-523
Primates	S-12	AD-425 542
	S-20	AD-418 269
Probability	S-24	NASA-CR-33
Programming (Computers)	S-40	NASA-TN-D-2174
		NASA-TN-D-2175
	S-45	NASA-TN-D-2120
	S-54	AD-410 244
		AD-411 277
	S-55	AD-406 155
Proprioception	S-1	PB-165 957
	S-4	AD-425 564
Proteus	S-16	PB-165 918
Protons	S-23	N64-18480
	S-51	NASA-CR-40
Psychometrics	S-2	PB-165 874
Psychometrics (con.)	S-3	PB-165 875
	S-39	AD-413 128
Psychomotor tests	S-20	PB-165 883
Psychophysiology	S-2	AD-422 291
	S-5	AD-423 385
Public health	S-15	AD-423 696
Pumping (Electronics)	S-51	PB-165 876
Purex process	S-25	HW-77080
Purine alkaloids	S-18	PB-165 328
Pyridines	S-21	IS-741
Pyrocatechol	S-9	PB-165 891
	S-18	AD-421 848
Pyrolysis	S-23	PB-165 258
Pyrotechnics	S-51	PB-165 876
Radar corner reflectors	S-27	PB-165 877
Radar tracking	S-26	AD-291 659
Radiation effects	S-20	AD-418 269
		AD-423 076
		PB-165 883
		PB-165 921
		PB-165 940
	S-47	N64-17684
Radiation measurement systems	S-45	AD-425 209
	S-46	AD-423 701
Radioactive batteries	S-31	OTS-SB-523
Radiochemical processing plants	S-44	HW-77770
Radiography	S-12	AD-425 542
Radioisotopes	S-44	HW-77770
Radiological dosage	S-20	PB-165 940
Radioprotective agents	S-19	PB-165 907
	S-20	AD-418 269
	S-21	AD-280 432
Rare earths	S-21	IS-770
Rats	S-5	PB-165 947
Re-entry vehicles	S-33	NASA-TN-D-2189
		NASA-TN-D-2268
Reactance amplifiers	S-26	AD-291 659
READI investigation	S-36	N64-17675
Reflectometers	S-27	PB-181 674
Reflectors	S-27	PB-165 877
Reflexes	S-4	AD-421 144
Refractory coatings	S-44	AD-423 179
Refractory materials	S-38	AD-423 686
Refractory metal alloys	S-42	AD-424 097
Reliability (Electronics)	S-49	AD-434 329
Reserpine	S-18	PB-165 925
Respiration	S-6	AD-403 116
		PB-165 929
	S-10	PB-165 926
	S-11	PB-165 888
	S-14	PB-165 895
	S-22	PB-165 892
Respiratory system	S-22	PB-165 892
Retina	S-11	AD-287 082
Reviews	S-34	AD-423 169
Ribonucleic acids	S-21	AD-280 432
Rickettsia	S-17	AD-279 089
Rocket motor nozzles	S-36	PB-165 338
Rocket motors	S-36	N64-17675
Rocket motors (Solid propellant)	S-36	PB-165 338
Rocket planes	S-25	NASA-TN-D-2289
Rockets	S-34	N64-18500
Saliva	S-9	PB-165 948
Salivary glands	S-8	PB-165 930
Satellites (Artificial)	S-33	NASA-TN-D-2198
		PB-165 872
	S-34	AD-423 169
Scanning	S-26	PB-165 330
Scientific research	S-53	OTS-SB-533
Scintillation counters	S-46	HW-SA-2932
Search radar	S-26	AD-291 659
Secondary emission	S-49	AD-423 378
Secretion	S-9	PB-165 948
Selenides	S-22	PB-165 879
Semicircular canals	S-4	AD-425 564
Semiconductor devices	S-51	NASA-CR-40
Semiconductors	S-48	AD-282 877
		AD-423 372
	S-49	AD-423 378
Serum albumin	S-17	AD-425 600
Sewage	S-34	AD-434 081
SGOOM(Lasers)	S-51	PB-165 876
Sheet beams	S-50	PB-165 635
Shelters	S-15	AD-423 696

Subject	Page	Number
Diseases	S-15	AD-423 696
Display systems	S-2	PB-165 332
		PB-165 874
	S-3	PB-165 875
Distribution theory	S-39	AD-280 119
Documentation	S-53	AD-273 115
	S-57	PB-165 306
Dogs	S-6	PB-165 929
Dolph antennas	S-29	PB-165 313
Dose rate	S-20	PB-165 940
Dosimeters	S-45	AD-283 916
		AD-283 918
	S-46	AD-280 434
Durak-B coatings	S-44	AD-423 179
Dynodes	S-49	AD-423 378
Ear	S-52	AD-424 891
Ecology	S-13	PB-165 880
Economics	S-35	PB-181 675
		PB-181 676
		PB-181 677
		PB-181 678
Elastic scattering	S-45	NASA-TN-D-2120
Elasticity	S-37	AD-425 215
	S-41	AD-424 879
Electric cables	S-46	AD-423 701
Electric propulsion	S-36	N64-18216
Electrical impedance	S-11	AD-423 077
Electrolytes (Physiology)	S-7	PB-165 906
	S-8	PB-165 924
Electromagnetic properties	S-32	NASA-CR-24
		NASA-CR-25
Electromagnetic wave reflections	S-52	AD-291 569
Electromagnetic waves	S-49	NASA-TN-D-2273
	S-52	AD-425 083
Electron beams	S-50	PB-165 633
		PB-165 634
		PB-165 635
Electron spin resonance	S-46	AD-280 434
Electron tube targets	S-32	AD-428 907
Electron tubes	S-49	AD-423 378
Electronic equipment	S-49	AD-434 329
Electroplating	S-43	AD-423 387
Emphysema	S-14	PB-165 895
Energy conversion	S-30	N64-18304
	S-32	AD-425 081
Enzyme inhibitors	S-18	PB-165 328
Enzymes	S-13	AD-422 688
	S-18	PB-165 925
Epinephrine	S-18	AD-426 121
Escherichia coli	S-13	PB-165 912
		PB-165 913
		PB-165 914
Exhaust nozzles	S-25	NASA-TN-D-2263
Exodontia	S-4	AD-279 506
Expanded plastics	S-41	AD-423 379
Explosion effects	S-47	AD-422 442
Explosive materials	S-22	PB-165 259
	S-23	PB-165 258
	S-34	PB-165 319
Eye	S-9	PB-165 933
Failure (Electronics)	S-49	AD-434 329
Fatigue (Mechanics)	S-39	AD-280 119
Fermi surface	S-47	IS-762
Fevers	S-5	PB-165 928
Fibers	S-37	AD-425 215
Filament wound construction	S-36	AD-405 551
Films	S-22	PB-165 879
Filters (Electromagnetic wave)	S-51	PB-165 339
Fishes	S-1	OTS-SB-530
Fission products	S-44	N64-18428
Flashblindness	S-8	PB-165 893
Fluid flow	S-41	AD-425 217
		NASA-TN-D-2262
Fluorescence	S-12	PB-165 916
Fluorides	S-21	AD-423 390
Foamed metals	S-41	AD-423 379
Foams	S-41	AD-423 379
Focusing	S-50	PB-165 633
		PB-165 634
		PB-165 635
Fokker-Planck equation	S-39	N64-17584
Food	S-1	OTS-SB-530
Forestry	S-1	OTS-SB-530
Fracture (Mechanics)	S-42	AD-428 226
Frequency meters	S-27	PB-181 655-1
Friction	S-24	NASA-TN-D-2280
Functions	S-41	PB-165 329
Gamma counters	S-46	AD-423 701
Gamma rays	S-1	N64-18432
Gas bearings	S-12	AD-279 504
	S-37	AD-425 220
Gas-cooled reactors	S-35	PB-181 677
Gas discharges	S-32	AD-425 081
Gas embolism	S-18	PB-165 932
Gas flow	S-24	NASA-TN-2280
Gas lubrication	S-41	AD-425 217
Geiger counters	S-45	AD-425 209
Generators	S-30	N64-18425
Geological survey	S-23	PB-165 318
Geology	S-23	OTS-SB-532
Germanium	S-48	AD-423 372
	S-49	AD-423 378
Glass	S-37	PB-165 335
		PB-165 336
	S-38	AD-425 080
Glass textiles	S-36	AD-405 551
Globulins	S-17	AD-425 600
Glucose	S-6	PB-165 929
	S-17	AD-425 692
Graphite	S-41	AD-423 379
Great Lakes	S-23	PB-165 318
Ground effect machines	S-35	PB-181 675
		PB-181 676
		PB-181 677
		PB-181 678
Groups (Mathematics)	S-39	N64-18448
Guanidines	S-19	PB-165 907
Bis (2-guanidoethyl) disulfide	S-19	PB-165 907
Guided missile batteries	S-29	PB-165 878
Guided missiles	S-33	PB-165 873
Gunnery	S-39	PB-165 321
Hearing	S-9	AD-280 423
		PB-165 956
	S-19	PB-165 881
	S-52	AD-424 891
Heart	S-6	PB-165 901
Heat	S-4	AD-421 144
Heat transfer	S-6	AD-426 008
	S-24	NASA-TN-D-2280
	S-42	NASA-TN-D-2054
	S-52	AD-433 587
Helicopters	S-25	AD-294 117
Helium	S-32	AD-425 081
Hematocrit	S-20	PB-165 921
Hematology	S-5	PB-165 947
Hemopoietic system	S-19	AD-280 419
Hestianic acid	S-10	AD-425 940
Hexachlorophene	S-13	PB-165 912
		PB-165 913
		PB-165 914
High altitude	S-8	PB-165 927
High speed photography	S-22	NASA-TN-D-2242
Human engineering	S-2	NASA-TN-D-2255
Hydrides	S-42	NAA-SR-7398
Hydrocortisone analogs	S-19	PB-165 917
Hydrodynamic configurations	S-41	AD-425 217
Hydrofoil boats	S-36	OTS-SB-529
Hydrology	S-23	OTS-SB-532
	S-39	AD-280 119
17-Hydroxycorticosteroids	S-4	AD-279 506
	S-19	PB-165 917
Hyperglycemia	S-20	AD-418 269
Hyperventilation	S-6	AD-403 116
	S-15	AD-423 948
	S-17	AD-426 027
Hypoglycemia	S-6	PB-165 929
Hypothermia	S-14	AD-295 588
		AD-295 662
Hypoxia	S-8	PB-165 924
	S-11	PB-165 937
Hypoxia-warning systems	S-11	PB-165 937
Immune serums	S-4	AD-280 433
	S-15	AD-281 391
	S-16	AD-279 091
Impact prediction	S-34	N64-18500
Impedance pneumograph	S-11	PB-165 888
Indexes	S-54	AD-431 950
Information retrieval	S-53	AD-273 115
	S-55	AD-406 155
	S-57	PB-165 306
Infrared filters	S-51	PB-165 339
Injections (Medical)	S-19	PB-165 922
Input-output devices	S-30	NASA-CR-32
Insect repellents	S-3	AD-423 397
Instruction manuals	S-15	AD-423 696
	S-40	NASA-TN-D-2174
		NASA-TN-D-2175
	S-54	AD-409 914
		AD-410 244
		AD-410 245
		AD-410 273
		AD-411 277
		AD-411 278
Instrument flight	S-1	PB-165 957
Ion Bombardment	S-47	NASA-TN-D-2235
Ionization chambers	S-45	AD-425 209
	S-46	AD-423 701
Ionosphere	S-23	PB-165 316
Iproniazid	S-18	PB-165 328
Isocyanate plastics	S-41	AD-423 379
JB 835	S-18	PB-165 328
Jets	S-25	NASA-TN-D-2263
Joints (Physiology)	S-17	PB-165 946
Journal bearings	S-37	AD-425 220
KA coatings	S-44	AD-423 179
Kanamycin	S-19	PB-165 881
KC-135 aircraft	S-2	AD-280 420
Kill probabilities	S-39	PB-165 321
Lakes	S-23	PB-165 318
Laminates	S-37	AD-425 889
Landing aids	S-25	NASA-CR-34
Landings	S-25	NASA-TN-D-2251
Lasers	S-50	AD-292 146
	S-51	PB-165 876
	S-52	AD-425 083
Lead	S-47	IS-762
Lead compounds	S-22	PB-165 259
		PB-165 879
	S-23	PB-165 258
Leukocytes	S-4	AD-420 947
Levarterenol	S-18	AD-426 121
Life span	S-20	AD-423 076
Life support	S-12	AD-424 120
Lift	S-24	IS-615
Light	S-9	PB-165 933
Light communication systems	S-24	N64-18442
Linear regression equations	S-39	AD-413 128
Linear systems	S-30	NASA-CR-32
Lipids	S-16	PB-165 935
Liquid metal cooled reactors	S-35	PB-181 677
Liver function tests	S-19	AD-280 419
Local anesthetics	S-18	PB-165 932
Low-pressure research	S-53	N64-17582
Lubrication	S-37	AD-425 220
	S-41	AD-425 217
Lungs	S-14	PB-165 895
Macaca mulatta	S-20	AD-423 076
Magnesium	S-7	PB-165 906
Magnetic recording systems	S-30	AD-430 890
Maintenance personnel	S-2	AD-280 420
Management engineering	S-54	AD-409 914
		AD-410 244
		AD-410 245
		AD-410 273
		AD-411 277
		AD-411 278
Manganese	S-45	AD-283 916
		AD-283 918
Mapping	S-23	PB-165 318
MARAD SES	S-35	PB-181 675
		PB-181 676
		PB-181 678
Marine surface propulsion	S-35	PB-181 675
		PB-181 676
		PB-181 677
		PB-181 678
Mars	S-13	PB-165 880
	S-14	AD-424 189

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- Establishing a new business

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- Development and maintenance of markets
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- Marketing and distribution statistics

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- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
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- Tariff and exchange regulations
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Subject	Page	Number
Ship hulls	S-41	AD-425 217
Ship structural components	S-37	AD-425 889
Ships	S-36	OTS-SB-529
Ships (Nonmilitary)	S-35	PB-181 675
		PB-181 676
		PB-181 677
		PB-181 678
Shock tubes	S-48	AD-407 553
Shock waves	S-41	AD-423 379
	S-47	AD-422 442
Silanes	S-21	AD-423 390
Silicides	S-44	AD-423 179
Silicon	S-51	N64-18301
Silicon dioxide	S-41	AD-423 379
Silicone plastics	S-43	AD-423 387
Simulators	S-12	AD-424 120
Single crystals	S-48	AD-423 372
	S-51	NASA-TN-D-2275
Skin	S-17	AD-403 595
Slurries	S-24	IS-615
Social psychology	S-3	AD-420 948
Sodium	S-7	PB-165 906
	S-21	NASA-TN-D-2276
Sodium compounds	S-32	PB-165 343
Sodium thiosulfate	S-19	AD-280 419
Solar energy	S-50	AD-292 146
Sound	S-52	AD-424 891
Space biology	S-13	PB-165 880
	S-14	AD-424 189
Space capsules	S-34	AD-423 169
Space communication systems	S-24	N64-18442
Space crews	S-3	AD-420 948
Space environmental conditions	S-44	N64-18428
Space flight	S-9	PB-165 891
	S-16	AD-403 092
Space medicine	S-6	AD-426 008
	S-15	AD-423 948
Space navigation	S-33	NASA-TN-D-2237
Space perception	S-1	PB-165 957
	S-2	AD-422 291
Spacecraft	S-36	N64-18216
Spacecraft cabins	S-3	AD-420 948
	S-12	AD-424 120
Spatial disorientation	S-1	PB-165 957
	S-2	AD-422 291
Spectroscopy	S-44	AD-423 179
Speech compression	S-53	AD-406 365
Spiral after effect test (SAET)	S-5	PB-165 959
Spores	S-14	AD-424 189
Sputtering	S-47	NASA-TN-D-2235
Stability	S-41	N64-18298
Standing wave ratios	S-27	PB-181 674
Starvation	S-7	PB-165 906
Statistical analysis	S-39	AD-280 119
Statistical tests	S-39	AD-413 128
Steel	S-42	AD-428 226
	S-43	AD-423 387
Stereoscopic display systems	S-2	PB-165 332
Stiffened cylinders	S-36	AD-405 551
Stimulation	S-4	AD-421 144
Stochastic processes	S-52	AD-433 587
Storage batteries	S-29	PB-165 878
	S-31	OTS-SB-523
		PB-165 344
Stratosphere	S-23	PB-165 316
Strength	S-39	AD-280 119
Stress (Physiology)	S-4	AD-279 506
Stress (Psychology)	S-5	AD-423 385
Stresses	S-24	N64-18445
	S-41	AD-424 879
Structural geology	S-23	PB-165 318
Structural shells	S-40	N64-18297
Structures	S-25	PB-165 340
	S-26	PB-165 341
Styrene plastics	S-38	AD-425 079
Submarine hulls	S-36	AD-405 551
Sucrose	S-25	HW-77080
Sulfides	S-22	PB-165 879
Superconductors	S-49	AD-423 378
Supernovae	S-1	N64-18431
Supersonic planes	S-25	NASA-TN-D-2251
Surface effect ships	S-35	PB-181 675
		PB-181 676
		PB-181 677
		PB-181 678
Symposia	S-49	AD-434 329
Tables	S-41	PB-165 317
Tantalum	S-44	AD-423 179
Taste	S-8	PB-165 930
Teeth	S-10	AD-287 093
	S-15	AD-425 541
	S-16	AD-403 092
		PB-165 935
	S-17	AD-425 600
		AD-425 692
Temporomandibular joint	S-17	PB-165 946
Test equipment (Electronics)	S-36	N64-17675
Thermal insulation	S-37	N64-17591
Thermionic converters	S-32	AD-425 081
Thermionic emission	S-48	AD-282 877
	S-49	AD-423 378
Thermoluminescent dosimeters	S-45	AD-283 916
		AD-283 918
Thermometers	S-31	AD-402 415
Thresholds (Physiology)	S-9	PB-165 956
Tiros satellites	S-34	AD-423 169
Titanates	S-32	PB-165 343
TNT	S-47	AD-422 442
Toilet articles	S-13	AD-422 688
Tolerances (Physiology)	S-13	PB-165 912
		PB-165 913
Topology	S-39	N64-18448
Torque	S-33	NASA-TN-D-2198
Toxic tolerances	S-17	AD-426 027
Tracking	S-2	NASA-TN-D-2255
Trailblazer	S-33	NASA-TN-D-2189
		NASA-TN-D-2268
Tranquilizers	S-18	PB-165 925
Transferases	S-18	PB-165 925
Transistors	S-31	AD-402 415
Transmission lines	S-28	PB-165 314
	S-29	PB-165 312
		PB-165 313
		PB-165 315
	S-52	AD-425 083
Transport planes	S-25	NASA-TN-D-2251
Transportation	S-35	PB-181 675
		PB-181 676
		PB-181 677
		PB-181 678
Traveling wave tubes	S-30	AD-290 479
Tuned amplifiers	S-26	AD-267 487
		AD-291 659
Tuned circuits	S-30	N64-18438
Tunnel diodes	S-49	AD-423 378
Tungsten	S-21	IS-741
	S-44	AD-423 179
Turbulence	S-23	PB-165 316
Turbulent boundary layer	S-42	NASA-TN-D-2247
		NASA-TR-165
Tyramine	S-18	AD-421 848
Ultraviolet radiation	S-12	PB-165 916
Ultraviolet spectrophotometers	S-50	NASA-TN-D-2250
Ultraviolet spectroscopy	S-24	N64-18300
Underwater equipment	S-31	PB-165 344
Upper atmosphere	S-22	N64-18121
	S-23	PB-165 316
	S-24	N64-18300
Uranium	S-42	NAA-SR-7398
Urea	S-7	PB-165 906
Uric acid	S-7	PB-165 906
Urine	S-6	AD-403 116
	S-9	PB-165 891
	S-18	AD-426 121
	S-19	PB-165 917
Vanadium compounds	S-21	AD-423 390
Vapors	S-21	NASA-TN-D-2276
Vector analysis	S-39	AD-413 128
Ventilation	S-6	AD-426 008
Vermis cerebelli	S-7	PB-165 952
Vestibular apparatus	S-4	AD-421 144
	S-7	PB-165 952
Vibration	S-41	PB-165 317
		PB-165 329
	S-48	NASA-TN-D-2266
Viruses	S-13	AD-279 090
	S-17	AD-279 089
Vision	S-8	PB-165 893
	S-9	PB-165 933
Visual perception	S-1	PB-165 957
	S-2	PB-165 874
	S-3	PB-165 875
	S-7	AD-422 509
Voice communication systems	S-53	AD-406 365
Waste processing	S-25	HW-77080
Wastes (Sanitary engineering)	S-10	AD-425 940
	S-34	AD-434 081
		AD-434 115
Water	S-6	AD-426 008
	S-45	CONF-187-113
Water-activated batteries	S-31	OTS-SB-523
Water recovery systems	S-12	AD-424 120
Water traffic	S-35	PB-181 675
		PB-181 676
Waveguide filters	S-32	AD-417 086
Waveguide slots	S-28	PB-165 311
	S-29	PB-165 310
	S-30	PB-165 309
Waveguides	S-27	PB-181 674
	S-30	PB-165 320
Wet cells	S-28	PB-165 337
Wind	S-34	N64-18500
Wing-body configurations	S-42	NASA-TN-D-2236
Wood	S-37	AD-425 889
Wounds and injuries	S-5	PB-165 959
	S-15	AD-423 696
X-15 aircraft	S-25	NASA-TN-D-2289
X-ray photography	S-12	AD-425 542
	S-38	AD-423 389
X-rays	S-1	N64-18431
Yeasts	S-21	AD-280 432
Zircaloy-2	S-43	AD-285 514
Zirconium	S-42	NAA-SR-7398

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